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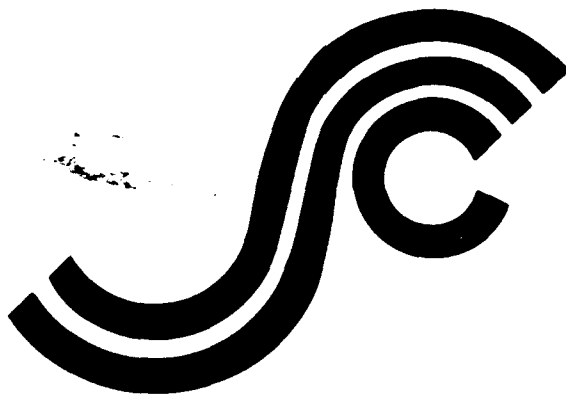
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# MARINE STRUCTURAL STEEL TOUGHNESS DATA BANK

(Volume 4)



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1991

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# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

Symbol When You Know Multiply by To Find Symbol

### LENGTH

in	inches	2.5	cm	centimeters
ft	feet	30	cm	centimeters
yd	yards	0.9	m	meters
mi	miles	1.6	km	kilometers

### AREA

in <sup>2</sup>	square inches	6.5	cm <sup>2</sup>	square centimeters
ft <sup>2</sup>	square feet	0.09	m <sup>2</sup>	square meters
yd <sup>2</sup>	square yards	0.8	m <sup>2</sup>	square meters
mi <sup>2</sup>	square miles	2.6	km <sup>2</sup>	square kilometers
	acres	0.4	ha	hectares

### MASS (weight)

oz	ounces	28	g	grams
lb	pounds	0.45	kg	kilograms
	short tons (2000 lb)	0.9	t	tonnes

### VOLUME

tsp	teaspoons	5	ml	milliliters
Tbsp	tablespoons	15	ml	milliliters
fl oz	fluid ounces	30	ml	milliliters
c	cups	0.24	l	liters
p. l.	pint	0.47	l	liters
qt	quarts	0.95	l	liters
gal	gallons	3.8	l	liters
ft <sup>3</sup>	cubic feet	0.03	m <sup>3</sup>	cubic meters
yd <sup>3</sup>	cubic yards	0.76	m <sup>3</sup>	cubic meters

### TEMPERATURE (exact)

F	Fahrenheit temperature	5/9 after subtracting 32	C	Celsius temperature
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## Approximate Conversions from Metric Measures

Symbol When You Know Multiply by To Find Symbol

### LENGTH

mm	millimeters	0.04	in	inches
cm	centimeters	0.4	in	inches
m	meters	3.3	ft	feet
m	meters	1.1	yd	yards
km	kilometers	0.6	mi	miles

### AREA

cm <sup>2</sup>	square centimeters	0.16	in <sup>2</sup>	square inches
m <sup>2</sup>	square meters	1.2	yd <sup>2</sup>	square yards
km <sup>2</sup>	square kilometers	0.4	mi <sup>2</sup>	square miles
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	acres

### MASS (weight)

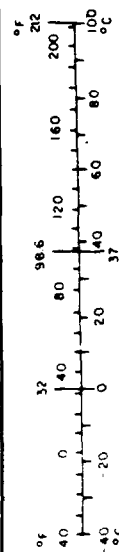
g	grams	0.035	oz	ounces
kg	kilograms	2.2	lb	pounds
t	tonnes (1000 kg)	1.1		short tons

### VOLUME

ml	milliliters	0.03	fl oz	fluid ounces
l	liters	2.1	pt	pints
l	liters	1.06	qt	quarts
l	liters	0.26	gal	gallons
m <sup>3</sup>	cubic meters	35	ft <sup>3</sup>	cubic feet
m <sup>3</sup>	cubic meters	1.3	yd <sup>3</sup>	cubic yards

### TEMPERATURE (exact)

C	Celsius temperature	9/5 (then add 32)	F	Fahrenheit temperature
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ABS-EH36 . . . . .	2100
A36 . . . . .	3100
<u>Volume 2</u>	
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A537 CL1 . . . . .	7300
A572 Gr50 . . . . .	7600
A588 . . . . .	8000
A710 . . . . .	9400
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<u>Volume 4</u>	
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HY100 . . . . .	19500

# A Marine Structural Toughness Data Bank

## Ship Structures Committee

### Final Report

## 1 Introduction

Despite the substantial number of data available on the toughness of a wide variety of steels which may be used for marine applications, including several important studies by the *Ship Structures Research Committee*, there has been no comprehensive source to which one might go to readily find well-documented numeric data for the full range of materials and types of data of interest. The *Ship Structures Committee* and the *U.S. Coast Guard* recently took the steps needed to begin the establishment of such a source, with first priority given to toughness data for high strength, low alloy steels.

This handbook provides the initial compilation for the Marine Structural Toughness Data Bank, a summary of data from about 10,000 tensile and toughness tests of hundreds of samples representing eleven steels of importance for marine applications.

The result of this program is not only a source of reliable and well-documented numeric data on the toughness of steels, but also the nucleus of a system which may be expanded to include other properties of these steels and other materials which might be considered for such applications. The source will be of value to all segments of the Marine Industry, commercial and military, and to a number of other industry groups which utilize these steels, as well as to the Steel Industry itself.

Also of significant consequence, the program has been carried out in a manner and with procedures and standards compatible with those in use in the development of machine-readable databases by groups such as the *National Materials Property Data Network, Inc.* (the *MPD Network*), a network of worldwide sources of data (Refs. 1,2). This assures the opportunity for easy and direct interface and interchange of data with many other sources of numeric materials data.

As an added advantage, new searchers who might be looking for the type of data contained herein but are unaware of the Marine Structural Toughness Data Bank will be directed to it via the online version being established under the name MARTUF on the *MPD Network*. Such users also have access to many other sources of materials data. For additional information on this mode of access to the Marine Structural Toughness Data Bank, please refer to Annex I to this document.

## 2 Scope

The scope of this program was the development of a data bank on the toughness of steels which may be considered for marine applications such as ship hulls and drilling structures. Eleven steels of importance to the member organizations of the *Ship Structures Committee* are included. Data from a variety of types of toughness tests were included in the database, including Charpy impact, fracture toughness, nil-ductility transition, and drop-weight tear tests. The emphasis of this project was on the collection of data, not its detailed analysis, though efforts were made to assure that problems with identity of individual lots or incomplete reporting of test data were dealt with.

The Marine Toughness Data Bank was developed both in hard copy, as summarized in this document, and in machine readable form. It is available in a searchable online version on the *MPD Network* (where it is referred to as MARTUF; see Annex II and Ref 1,2). It is also available on PC disks in the original Lotus 123 format in which it was assembled from the *Ship Structures Committee*. It is not searchable in this format.

### 3 Materials Included in Marine Toughness Data Bank

The scope of materials considered for inclusion in this data bank was established by the Technical Committee representing the *Ship Structures Committee*. The original list of materials with the priorities provided is shown in Table 1. The individual priorities for the materials within group 1 are those specifically provided by the Technical Committee; priority numbers within groups 2 and 3 were assigned arbitrarily for convenient reference.

Also shown in Table 1 are alternative designations by which these materials are often identified. Their detailed material property and chemical composition requirements are presented in Table 2, with the order in which the material are presented revised to group like alloys (based upon composition and properties) together. Together these two tables illustrate several important features which had a significant bearing upon the program, viz.:

1. The specifications and properties for these materials overlap to a great extent,
2. It is difficult to be certain which materials are completely equivalent and which are significantly different, and
3. A great amount of information is required in building a database for such materials to provide users with the background necessary to assure that useful and valid comparisons are being made.

This problem has been recognized previously, especially in regard to comparisons with steels covered by foreign specifications. Early and Himes (Refs 3, 4, 5) confronted the problem and determined that in comparing specifications and individual steels themselves it is necessary to consider the composition limits, material property limits, fabrication practices and resultant microstructures, specific quality assurance requirements before drawing conclusions on this matter. They further concluded that several U.S. and foreign steels widely considered to be equivalent were indeed not so when all of these factors were considered.

It was not possible within the constraints of this program to determine without question the relative equivalence of all of the lots of materials for which data were obtained and included in this reference source. Therefore in all cases the identities given individual lots of material in this data bank are those provided by the original investigators plus those from the Unified Numbering System Guide (Ref. 6).

However it is clear from Table 2 that there are several groups of similar materials included in the Marine Toughness Data Bank, notably:

- High strength, low alloy steels A514, HY80 and HY100 containing primarily Ni, Cr, Mn and Mo;
- High strength, low alloy steel A710 and HSLA 80 containing primarily Cu, Ni, Cr and Mo;
- Medium to high strength low alloy steels A537, CG-537, A656, A737, ABS-EH36, and API 5L containing primarily Mn; and
- Medium strength low alloy steels A36, A572, A588, A633, A678, BS4360 and ABS-B and E, also containing primarily Mn.

Within each of the groups the primary alloying elements largely overlap, and their distinctiveness arises from differences in minor alloying elements and mechanical property requirements.

## A Marine Structural Toughness Data Bank

In the course of this work it was determined that it is appropriate to include certain "equivalent" alloys in the high priority list (making due allowance for tensile strengths, overlapping compositions, etc.). This was based in part on commercial practices.

Priority Alloy	Equivalent
HY80	A543 GrC CL1
A710 GrA	A736
ABS EH36	A737 Gr B
A514E	A517E
HY100	A543 GrC CL2
API5LX60	A572

Given the conditions above and the sources and types of data included within the scope of the search, data were placed into the data bank for the following materials:

ABS-B	A36	A710/A710-A	BS4360 Gr 50D
ABS-EH32	A572 Gr 50	HY80	CG A537M (A537 Cl 1)
ABS-EH36	A588 Gr A	HY100	

These represent 10 of the top 15 priority alloys requested by the Technical Committee, and one (A572) within the second priority set.

**Alloying Identification Scheme:** It was found convenient when logging the data for inclusion in the data bank to use a three-part identification scheme, in which the first three digits identify the alloy (with a direct relationship to the priority listing provided by the technical Committee); the second set of three digits identifying the specific heat; and the final two digits identifying whether the test sample was parent (base) metal, weld metal or heat-affected zone (HAZ), plus in the latter case the approximate distance of the tested HAZ area from the weld fusion line, *i.e.*, where the base of the notch or precracked tip is positioned 1, 3, 5, etc. mm from the edge of weld deposit. Thus,

XXX.YYY.ZZ

where

XXX.	-Alloy Identifier, from priority code (Table 1)
YYY.	-Heat Number, sequential number
ZZ	-Sample Descriptor, as follows:
	.01 - Base Metal
	.02 - On fusion line
	.03 - 1 mm into HAZ
	.04 - 3 mm into HAZ
	.05 - 5 mm into HAZ
	.06 - 7 mm into HAZ
	.07 - 9 mm into HAZ
	.08 - 11 mm into HAZ
	.09 - All weld metal

In recording this data for retention on the computer, every effort was made to preserve as much detail as possible about the preparation of the specimens tested. It is hoped that this will permit studies to be made of the effects of compositional materials or process variables on performance. This is required recording ingot position, welding parameters, specimen location, information about prior staining and postwelding heat treatment.

In order to maintain the individuality of material information records which differed only slightly, letters or numbers were added to the Material Codes. For example, when the top and bottom of the ingot were studied T or B was added. If several strain-aging conditions were examined, S1, S2, etc. were noted. Multiple welds were recorded as A, B, C, D, etc.

One should be alert to those variables which may distinguish among the property records. For example, one may wish to search for deposit properties, in which case only ".09" records are of interest, or seek information about the fusion line, in which case records including ".02" (and possibly .03) will be of interest. The database offers the potential for studying differences in performance of the root pass or the last pass, or at the mid thickness, distinguishing between when it is or is not the weld root. Thus one must be careful not to mix weld data indiscriminately.

It goes without saying that distinctions between LT and TL specimens of the base metal need to be preserved. This was required as well for the weld deposit. It should be noted that L for the deposit was defined as the direction of travel. Since specimens were usually oriented perpendicular to the weld, a toughness measurement was usually described as TL in the deposit. At the fusion line and in the heat affected zone, the base metal specimens would all be transverse to the weld, but the TL orientation designated for the deposit would be switched to LT in the HAZ if the rolling direction were perpendicular to the welding direction.

It must be recognized that all position indicators and other descriptors of location relative to the fusion line or root or surface of the specimen are approximate. Nevertheless, considering all the variables provided for in the database may offer an explanation for some of the scatter in weldment performance observed. The reader should be acquainted with the data recording format if an in-depth study of materials or processing variables is intended.

## **4 Types of Data (Properties) Covered in the Program**

The types of data sought for the data bank included the following:

- Material characterization (including actual composition, fabrication information and weld procedures, where appropriate)
- Tensile properties
- Fracture toughness, from K<sub>Ic</sub> and J<sub>Ic</sub> tests
- Charpy V notched bar impact values
- Nil ductility transition temperature
- Dynamic tear energy

Other types of toughness data were also sought, providing test results for at least one of the types above were also presented, and provision for a wide variety of types was made in the schema for the basic structure of the database (Table 4, described in Section V) These additional types of data included:

- Precracked Charpy impact
- Precracked Charpy slow bend
- MRL crack arrest

- ESSO crack arrest
- Double TT crack arrest
- Wide plate tensile test
- Drop weight tear energy

Several other types of test data were also considered, including the Tearing Modulus, T, but the lack of standard test methods for such parameters led to their being dropped from further study. Interest was expressed in the inclusion of modulus of elasticity values at one point, but it was excluded because the types of tensile tests for which data were being input did not provide reliable measures of modulus in accordance with ASTM standards (ASTM Standard Method E 111).

In fact, during the collections of data, the vast majority of test results located and included within the data bank were from Charpy V notched bar impact tests; 643 of the 1017 records compiled contained Charpy data. Only relatively few fracture mechanics data (12 records, all J1c, and all representing HY80 and HY100) were found. The lack of fracture mechanics parameters found is undoubtedly related to the relatively tough nature of this general class of materials under conditions above their ductile-to-brittle transition temperature.

Table 3 is an "occurrence table" for the data bank, a matrix illustrating the various types of test records for the individual materials. The specific data associated with the various type of tests which were included in the database, and the meaning of the abbreviations are explained in Table 4, the data bank format (see Section V).

## 5 Format Development

The development of the overall format for the Marine Toughness Data Bank was an evolutionary process. A working format was established at the beginning of the program, covering the whole span of material characterization and test results sought, and the collection of data begun. Dr. Martin Prager, Executive Director of the *Materials Properties Council (MPC)*, was responsible for locating, compiling and evaluating the data. Over the following six-to-twelve months, various examples arose in which more detailed description of the materials or of welding processes or of certain types of test results were required. The result was several iterations in format development, some changes involving only refinements, but others very substantive improvements in documentation of the materials or test data.

The final format established for the data bank is illustrated in Table 4; it is basically a very broad, very long spread sheet, with the material description/test data relationship being basically hierarchical in nature, and with the various segments held together in a relational fashion around the material identifier code discussed above.

Three specific things were considered in establishing the data format: (1) the description and characterization of the materials for which data are shown in the system, (2) the data elements for the individual tests, and (3) the styles of presentation of the data when accessed following its compilation and inclusion in the database.

Considerable attention was given to the need to have adequate background on the materials so that comparisons of performance characteristics may be made reliably. The impact of such considerations is the inclusion of much more information than is likely to be desired by most users most of the time. However the result is the ability to track down a great amount of additional detail

for those situations where it may be necessary to ensure that comparisons are meaningful. Examples include the elemental composition of individual lots, the fabrication histories of the individual lots, and the procedures used in producing the welded samples.

A major advantage of the particular format in Table 5 is its essential consistency with those of other databases being built by *MPC* and *MPD Network* for steels for other applications, notably the *STEELTUF* database (7). Utilization of such a format, even with substantial modification, assures the ability to expand, combine and/or compare readily with these other sources.

**Compilation of Data:** In order to maximize the efficiency and consistency of compilation of data for this data bank, standard data collection formats were developed. The format used for this purpose in the current program is presented in Table 5.

## **6 Sources of Data**

The sources of data used in building the data bank included:

- Raw test results from ABS
- Raw test results from material suppliers
- Individual test results from papers and technical reports published by:
  - ASTM Special Technical Publications and Journals
  - Materials Properties Council
  - Naval Research laboratories
  - Welding Research Council
  - Electric Power Research Institute
  - Ship Structures Committees
  - American Welding Society
  - Nippon Kokan
  - United Kingdom Atomic Energy Association
  - American Society of Mechanical Engineers
  - Universities

## **7 Procedures Employed in Building the Data Bank**

The following basic steps were employed in building the *MARTUF* database:

1. Identification and procurement of data sources.
2. Review of document and completion of data compilation formats.
3. Transcription of data from source to *LOTUS 1-2-3* tabular format from information on compilation formats.
4. Development of a mapping program, and loading of file from *LOTUS 1-2-3* tabular format to a main-frame machine-readable database.



5. Mapping of the machine-readable form to print hardcopy handbook quality compilations.

The machine-readable version of the data bank was built and maintained at Stanford University in the SPIRES database management system (dbms). This software was developed at Stanford for library management and bibliographic search and retrieval purposes.

Preparation of the hardcopy database was accomplished under subcontract to Mr. William L. Anderson, of Elements Research, Inc., 2850 Middlefield Rd. #126, Palo Alto, CA 94306. The document was typeset in T<sub>E</sub>X and PostScript.<sup>1</sup>

## 8 Summary

The Ship Structures Committee has sponsored the development of a data bank covering the toughness of steels for marine applications. Effort focused on the identification and procurement of sources of data containing quantitative toughness data, and the development from those data of a well-documented computerized data bank available to a wide range of engineers and material scientists. Included were raw data from material suppliers and data from papers and technical reports published by a variety of organizations.

The principal focus was on Tensile, Charpy V notched bar impact values, fracture toughness (J<sub>Ic</sub>), NDTT, and DT energies; other toughness parameters were included if available for the same lots of material. The materials include steels identified by the Project Technical Committee representing the sponsoring agencies.

About 1000 records representing approximately 10,000 tests of eleven steels are included in this prototype version of the data bank. Standard procedures now exist for efficient addition of data for other alloys and properties.

## 9 References in the Report

1. J. G. Kaufman, "Sources and Standards for Computerized Materials Property Data and Intelligent Knowledge Systems", Engineering with Computers, ASME, Vol. 4, pp 75-85, 1988, New York, NY.
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3. NBSIR 82-2481, "Analysis of Foreign and Domestic Material Specifications for Ships Components", U.S. Dept. of Commerce, National Bureau of Standards, October 1981 (Issued April, 1982), Washington, DC.
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PostScript is a trademark of Adobe Systems Incorporation.

*A Marine Structural Toughness Data Bank*

5. H. Himes and J. G. Early, "*Evaluation Criteria for Comparison of Foreign and Domestic Material Specifications*", Journal of Testing and Evaluation, May, 1983, ASTM, Philadelphia, PA.
6. "*Metals and Alloys in the Unified Numbering System*", SAE HS J1086, ASTM DS-56C, Fourth Edition, April, 1986.
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TABLE 1  
MARINE STRUCTURAL TOUGHNESS DATA BANK

<u>COMMON NAME</u>	<u>ASTM SPEC</u>	<u>UNS NUMBER</u>	<u>PRIORITY</u>
HY80	A543 Gr C(1)	K31820	1-1
A710-A	A710 Gr A	K20747	1-2
CG A537M	A537 Cl 1	K12437	1-3
ABS-B	A131 Gr B	K02102	1-4
API 5L Gr X70	-	-	1-5
HSLA 80	-	-	1-6
ABS-EH36	A131 Gr EH36	K11852	1-7
A514E	A514 Gr E	K21604	1-8
A36	A36	-	1-9
BS 4360 Gr 50D	-	-	1-10
HY100	-	K32045	1-11
A588-81 Gr A	A588 GR A	K11430	1-12
A588 Gr B	A588 Gr B	K12043	1-12
A588 Gr C	A588 Gr C	K11538	1-12
A537-A	A537 Gr A	K02400	1-13
API 5L Gr X60	-	-	1-14
A656-70	A656 Gr 70	K11804	1-15
A572 Gr 50	A572 Gr 50	-	2-1
A678 Gr D	A678 Gr D	-	2-2
DIN 17100 St 52.3	-	-	2-3
JIS G3016	-	-	2-4
ABS-E	A131 Gr E	K01801	2-5
ABS DH36	A131 Gr DH36	-	2-6
A514A	A514 Gr A	K11856	3-1
A514F	A514 Gr F	K11576	3-2
A514P	A514 Gr P	K21650	3-3
A537-1	A537 Cl 1	K12437	3-4
A537-2	A537 Cl 2	K12437	3-5
A588	A588	K12040	3-6
A588-71 Gr F	A588 Gr F	K11541	3-7
ABS-CS	A131 Gr CS	K01601	3-8
ABS-DS	A131 Gr DS	K01601	3-9
ABS-AH32	A131 Gr AH32	K11846	3-10
ABS-EH32	A131 Gr EH32	K11846	3-11

Priorities: 1-1,2 etc  
2  
3

Technical Committee Priority 1 List  
Technical Committee Priority 2 List  
Other Grades of Alloys in Priority 1 List

Table 2 - Comparisons of Tensile Property and Composition Limits For  
Some Steels of Interest For Marine Applications

ALLOY DESIGNATIONS	SPECIFIED MINIMUM		SPECIFIED COMPOSITION, element, per cent													
	UTS	YS or YP	C		Mn		P		S		Si		Ni		Cr	
	ksi	ksi	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
A514 Gr E	100	90	0.20	0.12	0.70	0.40	0.035	0.040	0.20	-	-	-	-	-	2.00	1.40
A517 Gr E	115	100	0.20	0.12	0.70	0.40	0.035	0.040	0.35	0.20	-	-	-	-	2.00	1.40
A543 Type C Class 2	115	100	0.23	-	0.40	-	0.020	0.020	0.40	0.20	3.25	2.25	1.80	1.20	0.60	0.45
HY-100		100	0.20	-	0.40	0.10	0.025	0.025	0.35	0.15	3.50	2.25	1.80	1.00	0.60	0.20
HY-80		80	0.18	-	0.40	0.10	0.025	0.025	0.35	0.15	3.25	2.00	1.50	1.00	0.60	0.20
A543 Type C Class 1	105	85	0.23	-	0.40	-	0.020	0.020	0.40	0.20	3.25	2.25	1.80	1.20	0.60	0.45
A710 Gr A Class 2	72	65	0.07	-	0.70	0.40	0.025	0.025	0.40	-	1.00	0.70	0.90	0.60	0.25	0.15
A710 Gr A Class 3	85	75	0.07	-	0.70	0.40	0.025	0.025	0.40	-	1.00	0.70	0.90	0.60	0.25	0.15
MSLA 80 (MIL-S-24645)		80	0.07	-	0.70	0.40	0.025	0.010	0.70	-	1.00	0.70	0.90	0.60	0.25	0.15
CG-537M			0.16	-	1.50	0.90	0.035	0.040	0.35	0.15	0.25	-	0.25	-	0.08	-
A537/A537M Class 1	70	50	0.24	-	1.35	0.70	0.035	0.040	0.50	0.15	0.25	-	0.25	-	0.08	-
A537/A537M Class 2	80	60	0.24	-	1.35	0.70	0.035	0.040	0.50	0.15	0.25	-	0.25	-	0.08	-
ABS EH36	71	51	0.18	-	1.60	0.90	0.040	0.040	0.50	0.10	0.40	-	0.25	-	0.08	-
A737 Gr C	80	60	0.22	-	1.50	1.15	0.035	0.030	0.50	0.15	-	-	-	-	-	-
A656 Gr 70	80	70	0.18	-	1.65	-	0.025	0.035	0.35	-	-	-	-	-	0.35	-
API 5L Gr X60				-	1.60	-	0.040	0.050	-	-	0.50	-	-	-	-	-
API 5L Gr X70			0.15	-	1.60	-	-	-	-	-	-	-	-	-	-	-
A36	58	36	0.25	-	1.20	0.80	0.040	0.050	-	-	-	-	-	-	-	-
BS4360 Gr 50D			0.15	-	1.35	0.80	0.040	0.050	0.30	0.15	0.50	0.25	0.50	0.30	-	-
A588 Gr C	70	50	0.15	-	1.35	0.80	0.040	0.050	0.30	0.15	0.50	0.25	0.50	0.30	-	-
MS-B/ABS Gr B	58	34	0.21	-	1.10	0.80	0.040	0.040	0.35	-	-	-	-	-	-	-
A572 Gr 50 Type 1	65	50	0.23	-	1.65	-	0.040	0.050	0.40	-	-	-	-	-	-	-
A633 Gr A	63	42	0.18	-	1.35	1.00	0.040	0.050	0.50	0.15	-	-	-	-	-	-
A678 Gr C	90	70	0.22	-	1.60	1.00	0.040	0.050	0.50	0.20	-	-	-	-	-	-
ABS E	58	34	0.18	-	1.35	0.70	0.040	0.040	0.35	0.10	-	-	-	-	-	-

ALLOY DESIGNATIONS	SPECIFIED MINIMUM		SPECIFIED COMPOSITION, element, per cent													
	UTS	YS or YP	Cu		V		Cb(Nb)		Ti		B		Al		N	
	ksi	ksi	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
A514 Gr E	100	90	-	-	-	-	-	-	0.10	0.04	0.005	0.0015	-	-	-	-
A517 Gr E	115	100	0.40	0.20	-	-	-	-	0.10	0.04	0.01	0.00	-	-	-	-
A543 Type C Class 2	115	100	-	-	0.03	-	-	-	-	-	-	-	-	-	-	-
HY-100		100	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-
HY-80		80	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-
A543 Type C Class 1	105	85	-	-	0.03	-	-	-	-	-	-	-	-	-	-	-
A710 Gr A Class 2	72	65	1.30	1.00	-	-	0.02	-	-	-	-	-	-	-	-	-
A710 Gr A Class 3	85	75	1.30	1.00	-	-	0.02	-	-	-	-	-	-	-	-	-
MSLA 80 (MIL-S-24645)		80	1.30	1.00	-	-	-	-	-	-	-	-	-	-	-	-
CG-537M			0.35	-	-	-	-	-	-	-	-	-	-	-	-	-
A537/A537M Class 1	70	50	0.35	-	-	-	-	-	-	-	-	-	-	-	-	-
A537/A537M Class 2	80	60	0.35	-	-	-	-	-	-	-	-	-	-	-	-	-
ABS EH36	71	51	0.35	-	0.10	-	0.05	-	-	-	-	-	-	-	-	-
A737 Gr C	80	60	-	-	0.11	0.04	0.05	-	-	-	-	-	-	-	0.030	-
A656 Gr 70	80	70	-	-	-	-	0.07 0.020	-	-	-	-	-	0.02	-	0.030	0.1
API 5L Gr X60			-	-	0.02	-	0.05	-	-	-	-	-	-	-	-	-
API 5L Gr X70			-	-	0.10	-	0.05	-	-	-	-	-	-	-	-	-
A36	58	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BS4360 Gr 50D			0.50	0.20	0.10	0.01	-	-	-	-	-	-	-	-	-	-
A588 Gr C	70	50	0.50	0.20	0.10	0.01	-	-	-	-	-	-	-	-	-	-
MS-B/ABS Gr B	58	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A572 Gr 50 Type 1	65	50	-	0.20	-	-	0.05 0.005	-	-	-	-	-	-	-	-	-
A633 Gr A	63	42	-	-	-	-	0.05	-	-	-	-	-	-	-	-	-
A678 Gr C	90	70	-	0.20	-	-	-	-	-	-	-	-	-	-	-	-
ABS E	58	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Where composition or tensile properties vary with thickness, values are for 1-in. plate

## **10 Annex I: Summary and Directory of Data Sheets**

### **Summary and General Introduction**

**Table A** - List of Alloys and Directory for Data Bank

**Table B** - Explanation of Material Codes

**Table C** - List of Abbreviations and Symbols in Data Tables

**Table D** - List Abbreviations for Data References

### **10.1 Summary and General Description of Marine Toughness Data Bank**

The Marine Toughness Data Bank is a compilation of raw, individual test data for steels of interest to the marine industry. The data are organized in the attached pages by alloy and where possible by grade of the alloy. Data for individual lots of material are collected together, with a cover page providing the background identification, composition, fabricating history, and, in the case of welds, the weld procedures. Also included on the initial cover page for each individual lot are the tensile properties whenever those were available. Following the tensile properties are one or more of the following types of test results:

- Tensile tests per ASTM Method E 8
- Charpy V-notched bar impact (CVN) tests per ASTM Method E 23
- Fracture toughness (J-integral, JIc) tests per ASTM Method E 813
- Nil-ductility-transition temperature (NDTT) tests per ASTM Method E 208
- Dynamic tear (DT) tests per ASTM Method E 604
- Drop weight tear test per ASTM Method E 436

over a range (more than two) temperatures, the data are plotted as a function of temperature on uniform sized plots so that data from may be readily compared from lot to lot and alloy to alloy.

In general, the data are presented in the original units systems (SI - International Standard, or Engineering) in which they were reported. However, once again to facilitate comparisons, all plots are presented to uniform scales with both sets of units present. There were a few cases in which older metric unit systems were utilized, and in these cases, the values are converted to the SI system for presentation.

The information on the following pages will provide additional assistance in interpreting certain of the abbreviations and codes used in compiling the data.

**10.2 Table A - List of Alloys and Directory for Data Bank**

<b>Alloy Designation</b>	<b>Material Code</b> (See Table B)	<b>Page Number</b>
ABS-B	004	1000
ABS-EH32	032	2000
ABS-EH36	007	2100
A36	009	3100
CG A537M	003	7100
A537 CL1	003	7300
A572 Gr 50	016	7600
A588	012	8000
A710	002	9400
BS4360 Gr 50D	010	13800
HY80	001	16600
HY100	009	19500

### 10.3 Table B - Explanation of Material Codes

In logging the data for inclusion in the Marine Toughness Data Bank, a three-part identification scheme was used, in which:

- the first three digits identify the alloy;
- the second set of three digits identify the specific heat; and
- the final two digits identify whether the test sample was parent (base) metal, weld metal or heat-affected zone (HAZ), plus in the latter case the approximate distance of the HAZ from the weld line. In the case of welds, it was often useful to add one or more letters to document some other welding variable such as a postweld thermal treatment.

Thus, the complete material code for unwelded materials would be of the following form:

XXX.YYY.01

Where:

XXX.	-Alloy Identifier, from priority code (Table 1)
YYY.	-Heat Number, sequential number

And for a welded material it would be of this form:

XXX.YYY.ZZ/WWW

where

XXX.	-Alloy Identifier, from priority code (Table 1)
YYY.	-Heat Number, sequential number
ZZ	-Sample Descriptor, as follows:

- .01 - Base Metal
- .02 - On fusion line
- .03 - 1 mm into HAZ
- .04 - 3 mm into HAZ
- .05 - 5 mm into HAZ
- .06 - 7 mm into HAZ
- .07 - 9 mm into HAZ
- .08 - 11 mm into HAZ
- .09 - All weld metal

WWW -Weld descriptors

A - As welded

S - Stress relieved after welding

In either case (parent/base material or weld), one or more numbers may follow these codes (without any space) indicating different pieces or minor variations in treatments, which may be deduced by looking at the detailed composition, fabrication or welding history.

#### 10.4 Table C - Symbols and Abbreviations Used in Data Bank

##### Abbreviations for Heat Treatment and Final Processing:

A	Austenitized
B	Brine quenched
C	Cold rolled
D	Double normalized
F	Hot rolled
G	Hot forged
K	Aged
N	Normalized
P	Thermo-mechanical process
R	Continuous rolled
Q	Quenched
S	Stress-relieved
T	Tempered
W	Welded

##### Abbreviations for Alloying Elements:

C	Carbon	Mn	Manganese
P	Phosphorus	S	Sulfur
Si	Silicon	Cr	Chromium
Ni	Nickel	Mo	Molybdenum
V	Vanadium	Cu	Copper
Cb	Columbium	Ti	Titanium
B	Boron	Al	Aluminum
N	Nitrogen		

##### Abbreviations for Welding Procedures:

Weld type:	SAW	Submerged arc weld
	SMAW	Shielded metal arc weld
	TSAW	Tandem shielded submerged arc weld
	ESW	Electroslag weld
	NGESW	Narrow gap electroslag weld
Weld position:	IG	Downhand
	1G	Downhand
	2G	Horizontal
	3G	Vertical
	4G	Overhead

##### Abbreviations for Location of Test Sample:

T	Top	B	Bottom
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## A Marine Structural Toughness Data Bank

### Abbreviations for Specimen Orientation:

For tensile specimens:

L	Longitudinal
T	Long Transverse
S	Short Transverse

For all other specimens: two letter codes are used, with the first letter indicating the direction normal to the fracture plane; and the second letter indicating the expected direction of crack growth on the fracture plane.

The letters are:

L	Longitudinal
T	Long transverse
S	Short transverse

The common combinations are:

L-T,	L-S
T-L,	T-S
S-L,	S-T

**Abbreviations for Table Column Headings:**

Break?	Did specimen fracture completely?
COD <sub>Ic</sub>	Critical COD
COD <sub>i</sub>	Initial COD
CVN Energy	Charpy V Energy
Crack lgth	Crack Length
Curve	Curve Shape
DT Energy	Dynamic Tear Energy
E	Tensile Modulus
Filler	Filler Alloy
Frac Apear	Appearance
Fracture?	Did Specimen Fracture?
Gage Lngth	Gage Length
Inv Basis	Reason for Invalid
Is Valid?	Valid K <sub>Ic</sub> ?
JI	Initial JI
J <sub>max</sub>	Maximum J, J <sub>max</sub>
Lat Expans	Lateral Expansion
Load Rate	Loading Rate
Load Type	Loading Type
NDTT	Nil Ductility Transition Temperature
Notch Prep	Notch Preparation
Orien	Orientation
RA	Reduction in Area
Shear	Shear Fracture
Spec Thick	Specimen Thickness
Spec Type	Specimen Type
Split?	Did Specimen Split?
Std Method	Standard Method Designation
Std Year	Year Standard Issued
TYP	Tensile Yield Point
TYS	Tensile Yield Strength
TYS Offset	Tensile Strength Offset
Tear Mod	Tearing Modulus
Test Temp	Test Temperature
UTS	Tensile Strength
Uniform El	Uniform Elongation

**10.5 Table D - List Abbreviations for Data Source References:**

- 004-2** — "Approval Testing of Ship Steel Grades A, B, D and E, Produced via the Continuous Slab Caster Process," Australian Iron and Steel Property Ltd., 1980
- 007-1** — Kobe Steel Reports on "Quantitative Examination for Approval of Higher Strength Hull Structural Steel Plate Quench and Temper Type," to ABS, Kobe Steel Ltd., Kakogawa Plant, 1972
- 007-4** — Sumitomo Test Report on "Approval of Higher Strength Hull Steel Plates Rolled from Contiguously Cast Slab" to ABS, Sumitomo Metal Industries Ltd., Kashima Steel Works, November 1972
- 1010** — Lukens Steel Company, Data Report Project 1010
- 1211** — Lukens Steel Company, Data Report Project 1211
- 3200** — Lukens Steel Company, Data Report Project 3200
- 3201** — Lukens Steel Company, Data Report Project 3201
- 3202** — Lukens Steel Company, Data Report Project 3202
- 3400** — Lukens Steel Company, Data Report Project 3400
- 3530** — Lukens Steel Company, Data Report Project 3530
- ARMCO-MPC** — ARMCO Steel Data Submitted for MPC Survey
- KONKOL-1** — Konkol, P. J., Effects of Long-Time Post Weld Heat Treatment on the Properties of Constructional Steels, WRC Bulletin 330, January 1988
- METZ/MPC-13** — Metz, P. O., "Toughness of C-Mn Structural Steels," in Fracture Toughness of Wrought and Cast Steels, ASME Publication MPC-13, 1980
- RP1120** — Lukens Steel Company, Data Report Project RP1120
- S-1971** — "Sumitomo Metal Industries Approval Test Report of Hull and Steel Plates Rolled from Continuously Cast Slab, Grades A, R, B, C, D and E," Sumitomo Metal Industries Ltd., Wakayama Steel Works, April 15, 1971
- SH-01** — Properties of Normalized Steel Plates (Equivalent to BS4360 Gr. 50D) with Z Properties, Sumitomo Heavy Industries
- SSC276** — Francis, P. H., Cook, T. S. and Nagy, A., Fracture Behavior Characterization of Ship Steels and Weldments, SSC-276, Final Report on Project SR-1224 (Fracture Criteria), Ship Structures Committee, U. S. Coast Guard Headquarters, 1978
- USN-1** — U. S. Navy First Article Qualification Processing Information for Indicated Heat
- USN 4/7** — U. S. Navy Technical Report, MPC Archival Record 4/7
- USN 5/7** — U. S. Navy Technical Report, MPC Archival Record 5/7

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**USN 5/9** — U. S. Navy Technical Report, MPC Archival Record 5/9

**USN 6/9** — U. S. Navy Technical Report, MPC Archival Record 6/9

**USN 7/9** — U. S. Navy Technical Report, MPC Archival Record 7/9

**USN 8/9** — U. S. Navy Technical Report, MPC Archival Record 8/9

**USN 9/9** — U. S. Navy Technical Report, MPC Archival Record 9/9

**WELLMAN-WRC** — Wellman, G. W. *et al*, "Specimen Thickness Effects for Elastic Plastic CTOD Fracture Specimens of an A36 Steel," WRC Bulletin 328, Nov. 1987

**WJ 3/87** — "Welded HY-80 Steel for Australian Warships," Welding Journal 66(3), March 1987, pp. 33-44

**WJ 7/87** — Rodgers, K. J. and Lochhead, J. C., "Self-Shielded Flux Cored Arc Welding - The Route to Good Fracture Toughness," Welding Journal 66(7), July 1987, pp. 49-59

## **11 Annex II: Martuf on MPD Network**

As noted in the body of this document, a machine-readable and searchable version of the Marine Structural Toughness Data Bank, known as MARTUF, has been developed and is accessible via the National Materials Property Data Network (*MPD Network*) on *STN International*. For more information, contact:

J. G. Kaufman, President  
National Materials Property Data Network, Inc.  
2540 Olentangy River Road  
Columbus, Ohio 43202

## **12 Annex III: Data Collection Formats**

The following pages contain formats used during the collection of data for the Marine Toughness Data Bank.

FORMATS.TXT

For File Use only  
Entered into \_\_\_\_\_ WK1  
lines \_\_\_\_\_ to \_\_\_\_\_  
Date \_\_\_\_\_ 19\_\_\_\_

Information included: Wld, Ten, FT, CV, NDT, DWT, DT, MRL  
WORKSHEETS FOR U. S. COAST GUARD DATABASE (based on marindbs: 12/30/87)  
FRACTURE PROPERTIES OF STEELS FOR MARINE APPLICATIONS

BACKGROUND

0-1 Material Code \_\_\_\_\_

\*0-1a Common material name \_\_\_\_\_

0-1b UNS desig. \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-1c ASTM specification no. \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-1d AISI desig. \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-1e Military spec. \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-1f Other designation \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-2a Base Metal \_\_\_\_\_ WM-Wrought metal \_\_\_\_\_ CM-Cast metal \_\_\_\_\_ WJ-Welded joint only

\*0-2b Basic Form \_\_\_\_\_ P-Plate \_\_\_\_\_ A-Angle \_\_\_\_\_ C-Channel \_\_\_\_\_ W-Web of shape  
\_\_\_\_\_ T-Pipe \_\_\_\_\_ B-Bar \_\_\_\_\_ S-Shape \_\_\_\_\_ F-Flange of shape

\*0-3 Thickness \_\_\_\_\_ mm \_\_\_\_\_ in. \_\_\_\_\_ See \_\_\_\_\_  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-4 Composition type \_\_\_\_\_ S-refer to specification  
\_\_\_\_\_ N-nominal (not measured)  
\_\_\_\_\_ A-actual;

0-4aa Composition Position \_\_\_\_\_ T-Top, \_\_\_\_\_ B-Bottom, \_\_\_\_\_ L-Ladle, \_\_\_\_\_ W-Weld  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-4a-o Actual Composition \_\_\_\_\_ See \_\_\_\_\_

0-4p Composition Comments \_\_\_\_\_

0-5 Total Processing \_\_\_\_\_  
(Choose letters to indicate steps and order of treatment)

_____ A-austenitized	_____ N-normalized
_____ B-brine quenched from A	_____ P-thermo-mechanical process
_____ C-cold working	_____ R-continuous rolled
_____ D-double normalized	_____ Q-quenched
_____ F-hot rolled	_____ S-stress relieved
_____ G-hot forged	_____ T-tempered
_____ K-aged	_____ W-welded

\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

\*0-6 Producer's Heat Lot Number \_\_\_\_\_  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-7 Producer (name of producing company) \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-7a Year of production \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-8 Additional information? \_\_\_\_\_

0-9 Source of data/laboratory \_\_\_\_\_  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

\*0-10 Source of data/reference \_\_\_\_\_  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-11 Melting practice \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-12 Ingot position \_\_\_\_\_ top \_\_\_\_\_ middle \_\_\_\_\_ bottom \_\_\_\_\_ cont. cast. \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-13 Killing \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-14 Process temp. \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-15 Process time \_\_\_\_\_ hr \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-16 Rolling conditions \_\_\_\_\_ % reduction, total \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

\*0-17 Final processing steps (use one or two letters)

_____ A-austenitized	_____ N-normalized
_____ B-brine quenched from A	_____ P-thermo-mechanical process
_____ C-cold working	_____ R-continuous rolled
_____ D-double normalized	_____ Q-quenched
_____ F-hot rolled	_____ S-stress relieved
_____ G-hot forged	_____ T-tempered
_____ K-aged	_____ W-welded

0-18 Final heat treat temp. \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-19 Final heat treat time \_\_\_\_\_ hr \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-20 Cold work strain \_\_\_\_\_ % \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-21 S/R or Aging temp. \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK \_\_\_\_\_ See \_\_\_\_\_  
\_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.

0-22 S/R or Aging time \_\_\_\_\_ hr \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y. See \_\_\_\_\_

0-23 Location \_\_\_\_\_

W-0 Material Key \_\_\_\_\_  
 W-1 Weld Code \_\_\_\_\_  
 W-2 Welding Process  
     \_\_\_ SAW      \_\_\_ NGGMA      \_\_\_ GMA      \_\_\_ ESW  
     \_\_\_ SMA      \_\_\_ NGSAW      \_\_\_ GTA      \_\_\_ EBW  
     \_\_\_ FCA      \_\_\_ TSAW      \_\_\_ PAW      \_\_\_ n.r.      \_\_\_ n.y.  
 W-3 Base Metal Thickness \_\_\_\_\_ mm \_\_\_\_\_ in \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-4 Welding Position \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-5 Preheat temp. \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-6 Gap \_\_\_\_\_ mm \_\_\_\_\_ in \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-7 Interpass temp. \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-8 Number of passes \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-9 Welding filler, Spec. and Grade \_\_\_\_\_  
     \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-10 Welding Filler Trade Name \_\_\_\_\_  
 W-11 Carbon content \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-12 Filler size \_\_\_\_\_ mm \_\_\_\_\_ in \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-13 Shielding Gas \_\_\_ A \_\_\_ He \_\_\_ M-mixed \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-14 Voltage \_\_\_\_\_ volts \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-15 Amperage \_\_\_\_\_ amps \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-16 Polarity \_\_\_\_\_  
 W-17 Travel Speed \_\_\_\_\_ in/min \_\_\_\_\_ mm/min \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-18 Heat Input/pass \_\_\_\_\_ KJoules/mm \_\_\_\_\_ KJoules/in \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-19 Joint Prep. \_\_\_ V \_\_\_ U \_\_\_ K \_\_\_ S.B. \_\_\_ D.V. \_\_\_ D.U. \_\_\_ N.G. \_\_\_\_\_  
     \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-20 Number of sides welded \_\_\_ 1 \_\_\_ 2 \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-21 Welded Specimen Codes  
     Location relative to weld: (See below)  
     \_\_\_ 09-Weld Metal  
     \_\_\_ 02-Fusion Line  
     \_\_\_ 03-1mm HAZ  
     \_\_\_ 04-3mm HAZ  
     \_\_\_ 05-5mm HAZ  
     \_\_\_ 06-7mm HAZ  
     \_\_\_ 07-9mm HAZ  
     \_\_\_ 08-11mm HAZ  
     \_\_\_ 10-Transverse Section Test (All Zones)  
     \_\_\_ 11-50%WM-50%HAZ  
 W-22 Location relative to surface: (See below)  
     \_\_\_ F-Final surface  
     \_\_\_ R-Back surface (root)  
     \_\_\_ M-Mid thickness (not root)  
     \_\_\_ C-Mid thickness (root)  
     \_\_\_ B-Back surface (not root)  
     \_\_\_ N-Full cross section  
     \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-23 Postweld heat treat. temp (See below) \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK  
     \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-24 Post-weld heat treatment time \_\_\_\_\_ hr (See below)  
     \_\_\_\_\_ n.r. \_\_\_\_\_ n.a. \_\_\_\_\_ n.y.  
 W-25 Flux type \_\_\_\_\_  
 W-26 Flux Trade Name \_\_\_\_\_  
 W-27 Is actual weld deposit reported in 0-4? \_\_\_ Yes \_\_\_ No \_\_\_\_\_ n.y.  
 W-0 Material Key Code (See total number below) \_\_\_\_\_



[illegible]

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2-0 Material Key \_\_\_\_\_  
 \*2-1 Type of test (fracture toughness) \_\_\_\_\_  
 2-2 Position of specimen n.r. n.a. n.y. See \_\_\_\_\_  
     Full-thickness \_\_\_\_\_  
     Surface, 0/4T \_\_\_\_\_ Quarter-thickness, 1/4T \_\_\_\_\_  
     3/8 thickness \_\_\_\_\_ Mid thickness, 1/2T \_\_\_\_\_  
     Opposite surface, 1T \_\_\_\_\_ Third quarter thickness, 3/4T \_\_\_\_\_  
 \*2-3 Orientation of specimen See \_\_\_\_\_  
     L-T L-S L-C L-R T-L  
     T-S S-L S-T C-L C-R  
     R-C n.r. n.a. n.y. \_\_\_\_\_  
 \*2-4 Type of specimen n.r. n.a. n.y. See \_\_\_\_\_  
     Compact \_\_\_\_\_ Side-grooved compact Bend \_\_\_\_\_  
     Deep notch bend DCB WOL \_\_\_\_\_  
 \*2-5 Thickness of specimen \_\_\_\_\_ mm \_\_\_\_\_ in See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-6 Initial crack length, average \_\_\_\_\_ mm \_\_\_\_\_ in See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-6a a/W See \_\_\_\_\_ n.r. n.a. n.y. \_\_\_\_\_  
 2-7 Type of loading Slow Intermediate High Rate \_\_\_\_\_  
     n.r. n.a. n.y. See \_\_\_\_\_  
 2-8 (Kdot) Rate of loading \_\_\_\_\_ See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 \*2-9 Test temperature \_\_\_\_\_ degC \_\_\_\_\_ degF \_\_\_\_\_ degK \_\_\_\_\_ RT (20C)  
     See \_\_\_\_\_ n.r. n.a. n.y. \_\_\_\_\_  
 \*2-10 KQ \_\_\_\_\_ n.r. n.a. n.y. See \_\_\_\_\_  
 2-11 K<sub>IC</sub> \_\_\_\_\_ n.r. n.a. n.y. See \_\_\_\_\_  
 \*2-12 Valid measure of K<sub>IC</sub>? yes no See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 \*2-13 If invalid, reason See \_\_\_\_\_  
     (T)thickness \_\_\_\_\_ (CL)crack length \_\_\_\_\_ (FP)fatigue precrack \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-14 J<sub>IC</sub> \_\_\_\_\_ units \_\_\_\_\_ See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-15 Reported stress intensity factor from J<sub>IC</sub> \_\_\_\_\_ units \_\_\_\_\_ MPa\*m\*\*0.5  
     n.r. n.a. n.y. See \_\_\_\_\_  
 2-16 Method of J<sub>IC</sub> Calculation n.r. n.a. n.y. See \_\_\_\_\_  
     per Stand. modified Stand. other: \_\_\_\_\_  
 2-17 Initiation crack opening displacement \_\_\_\_\_ mm \_\_\_\_\_ in See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-18 Critical CTOD \_\_\_\_\_ mm \_\_\_\_\_ in See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-18a Is Critical CTOD c-cleavage u-cleavage preceded by tearing m-fibrous  
 2-19 Initiation J value \_\_\_\_\_ units \_\_\_\_\_ See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-20 Maximum J value \_\_\_\_\_ units \_\_\_\_\_ See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-20a No. of J specimens \_\_\_\_\_ See \_\_\_\_\_ n.r. n.a. n.y. \_\_\_\_\_  
 2-21 Tearing modulus \_\_\_\_\_ units \_\_\_\_\_ See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-22 Standard \_\_\_\_\_ ASTM \_\_\_\_\_ or other standard: \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_  
 2-23 Year of issue of test standard 19 \_\_\_\_\_ See \_\_\_\_\_  
     n.r. n.a. n.y. \_\_\_\_\_

3-0 Material Key \_\_\_\_\_  
 \*3-1 Type of test: CVN-Charpy V notched bar impact  
                   PCV-Precracked Charpy V notched bar impact  
 3-2 Position of specimen n.r. n.a. n.y. See \_\_\_\_\_  
       Surface, 0/4T Quarter-thickness, 1/4T  
       3/8 thickness, 3/8T Mid thickness, 1/2T  
       Opposite surface, 1T Third quarter thickness, 3/4T  
 \*3-3 Type of specimen See \_\_\_\_\_  
       Full: full-width Charpy V 1/2W: One-half width Charpy V  
       2W: Twice-width Charpy V 1/4W: One-quarter width Charpy V  
 \*3-4 Orientation of specimen See \_\_\_\_\_  
       L-T T-L L-C L-R L-S  
       T-S S-L S-T C-L C-R  
       R-C n.r. n.a. n.y.  
 \*3-5 Test temperature degC degF degK RT(20C)  
       n.r. n.a. n.y. See \_\_\_\_\_  
 3-6 Total energy to fracture J Ft-Lb See \_\_\_\_\_  
 3-7 Lateral expansion mm mils See \_\_\_\_\_  
       n.r. n.a. n.y.  
 3-8 Shear fracture % Brittle fracture % See \_\_\_\_\_  
       n.r. n.a. n.y.  
 3-9 Did specimen fracture completely yes no assumed  
       n.r. n.a. n.y. See \_\_\_\_\_  
 3-10 Did specimen exhibit splitting yes no See \_\_\_\_\_  
       n.r. n.a. n.y.  
 3-11 Standard ASTM or other standard  
       n.r. n.a. n.y.  
 3-12 Year of issue of test standard 19 See \_\_\_\_\_  
       n.r. n.a. n.y.

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4-0 Material Key \_\_\_\_\_  
 4-1 Type of test: MRL Crack arrest  
 4-2 Position of specimen n.r. n.a. n.y. See \_\_\_\_\_  
       Surface, 0/4T Quarter-thickness, 1/4T  
       3/8 thickness Mid thickness, 1/2T  
       Opposite surface, 1T Third quarter thickness, 3/4T  
 4-3 Type of specimen DCB  
       n.r. n.a. n.y. See \_\_\_\_\_  
 4-4 Thickness of specimen mm in See \_\_\_\_\_  
       n.r. n.a. n.y.  
 4-5 Orientation of specimen See \_\_\_\_\_  
       L-T L-S L-C L-R T-L  
       T-S S-L S-T C-L C-R  
       R-C n.r. n.a. n.y.  
 4-6 Test temperature degC degF degK RT(20C)  
       n.r. n.a. n.y. See \_\_\_\_\_  
 4-7 Rate of loading Slow Intermediate High See \_\_\_\_\_  
       n.r. n.a. n.y.  
 4-8 KQ n.r. n.a. n.y. See \_\_\_\_\_  
 4-9 Valid measure of KIC yes no See \_\_\_\_\_  
       n.r. n.a. n.y.  
 4-10 Reason for invalidity thickness See \_\_\_\_\_  
       n.r. n.a. n.y.  
 4-11 Crack arrest stress intensity See \_\_\_\_\_  
       n.r. n.a. n.y.  
 4-12 Standard ASTM or other standard  
       n.r. n.a. n.y.  
 4-13 Year of issue of test standard 19 See \_\_\_\_\_  
       n.r. n.a. n.y.

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### 13 Data Presentations for Marine Materials

Data presentations of all marine materials begin on page 1000. A brief table of contents is:

ABS-B .....	1000
ABS-EH32 .....	2000
ABS-EH36 .....	2100
A36 .....	3100
CG A537M .....	7100
A537 CL1 .....	7300
A572 Gr50 .....	7600
A588 .....	8000
A710 .....	9400
BS4360 Gr50D .....	13800
HY80 .....	16500
HY100 .....	19500

On each report, background information and material properties are grouped into categories: *Description*, *Composition*, *Fabrication History*, *Weld*, and *Property Measurements*. Constant information is not repeated, but a note refers the reader to a previous page. Material property plots show both SI and traditional engineering units. A complete index appears at the end on page I (roman numeral). All nonnumeric values are indexed twice: as "*value variable*" and as "*variable, value*".

# Marine Structural Toughness Data Bank

Material HY80

Page 16500.1

<b>Description</b>			
Material Code	001.001.09B	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,3/87		
<b>Composition</b>			
C	0.060 %	Mn	1.17 %
P	0.013 %	S	0.006 %
Si	0.32 %	Cr	0.15 %
Ni	1.80 %	Mo	0.40 %
V	0.026 %	Cu	0.020 %
Cb	*	Ti	*
B	*	Al	*
N	*	Other Components	*
<b>Fabrication History</b>			
Heat Treatment	*	Producer	Bunge
Year Produced	*	Addl Info	None
Source	P&EStat	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	001.001.09B	Weld Type	SMA
Base Metal Thickness	32 mm	Welding Position	Downhand
Preheat Temperature	150 degC	Metal Gap	0 mm
Interpass Temperature	150 degC	Passes	>40
Filler Specification	E10018	Filler Name	*
Filler Carbon Content	0.06 %	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	23-26 volts
Amperage	160-200 amps	Polarity	DC
Travel Speed	160-300 mm/min	Heat Input/Pass	25 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	Basic	Flux Name	*
Weld Composition Reported?	Yes		

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY80

Page 16500.2

(continued)

Property Measurements						
Test Type	Tensile		Position	*		
Specimen Type	Cylindrical		Specimen Thickness	5.9 mm		
Gage Length	23.6 mm		Loading Rate	*		
Tensile Strength Offset	*		Uniform Elongation	*		
Tensile Modulus	*		Standard Method	E 8		
Standard Year	1981					
Orient	Test Temp degC	UTS MPa	TYS MPa	TYP MPa	Elongation %	RA %
L	-18	793	738	*	21.5	62

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16500.3

<b>Description</b>			
Material Code	001.001.09B	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,3/87		
<b>Composition</b>		See Page 16500.1	
<b>Fabrication History</b>		See Page 16500.1	
<b>Weld</b>		See Page 16500.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	E 23
Standard Year	1981		

Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	65
T-L °	-40	70
T-L °	-40	81
T-L °	-18	105
T-L °	-18	110
T-L °	-18	119
T-L °	0	111
T-L °	0	117
T-L °	0	119

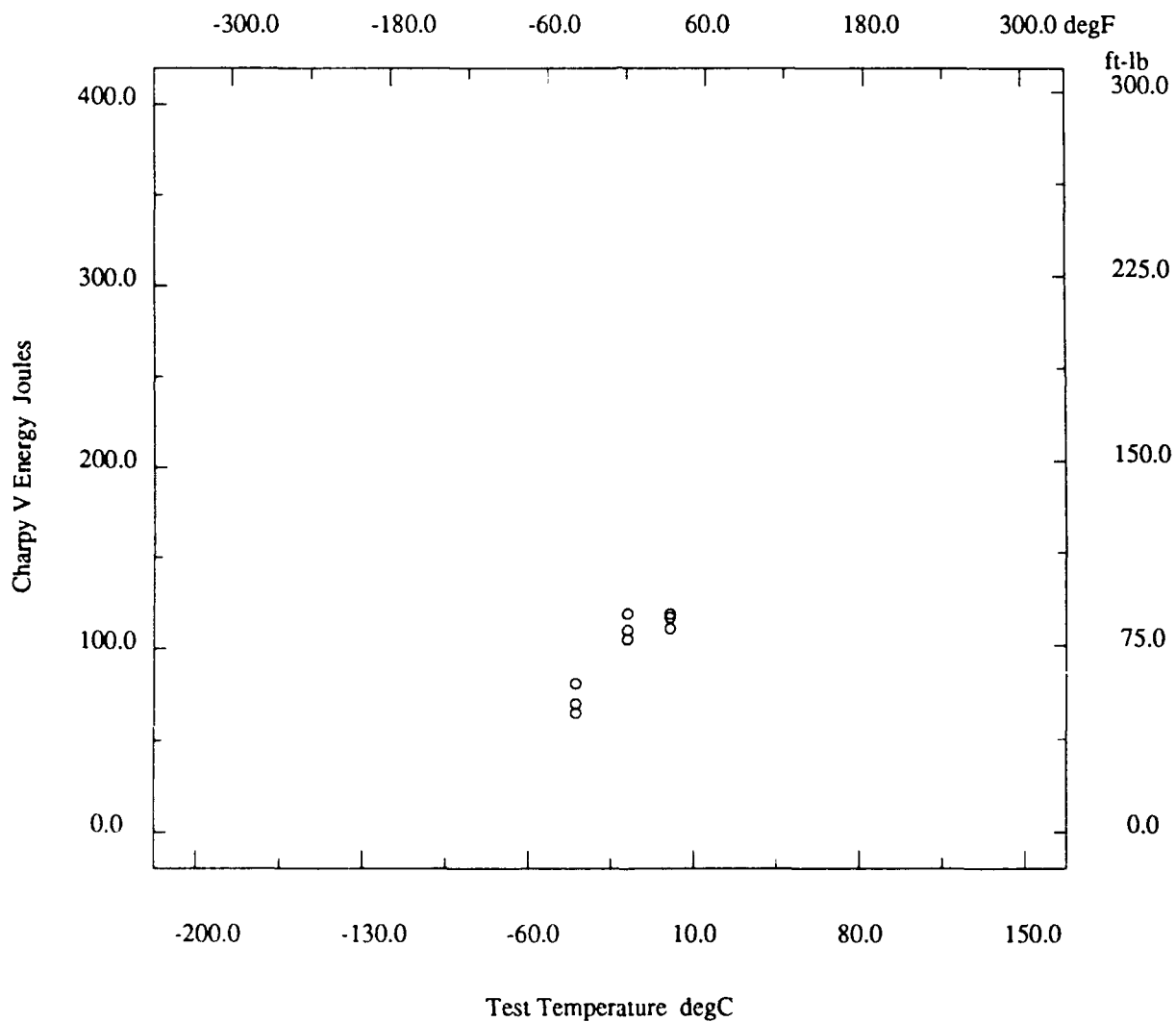
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16500.4

Description			
Material Code	001.001.09B	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,3/87		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 16500.5

<b>Description</b>			
Material Code	001.001.09F	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,3/87		

<b>Composition</b>			
C	0.080 %	Mn	1.24 %
P	0.013 %	S	0.007 %
Si	0.44 %	Cr	0.13 %
Ni	2.10 %	Mo	0.40 %
V	0.017 %	Cu	0.020 %
Cb	*	Ti	*
B	*	Al	*
N	*	Other Components	*

<b>Fabrication History</b>	See Page 16500.1
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<b>Weld</b>			
Weld Code	001.001.09F	Weld Type	SMA
Base Metal Thickness	32 mm	Welding Position	Downhand
Preheat Temperature	150 degC	Metal Gap	0 mm
Interpass Temperature	150 degC	Passes	>40
Filler Specification	E10018	Filler Name	*
Filler Carbon Content	0.08 %	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	23-26 volts
Amperage	160-200 amps	Polarity	DC
Travel Speed	160-300 mm/min	Heat Input/Pass	25 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	Basic	Flux Name	*
Weld Composition Reported?	Yes		

<b>Property Measurements</b>			
Test Type	Tensile	Position	*
Specimen Type	Cylindrical	Specimen Thickness	5.9 mm
Gage Length	23.6 mm	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	E 8
Standard Year	1981		

Orient	Test Temp degC	UTS MPa	TYS MPa	TYP MPa	Elongation %	RA %
L	-18	751	644	*	28.0	68

\* not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16500.6

<b>Description</b>	
Material Code . . . . .	001.001.09F
UNS . . . . .	*
Type . . . . .	Welded Joint
Thickness . . . . .	50 mm
Composition Position . . . . .	*
Reference . . . . .	WJ.3/87
<b>Composition</b>	See Page 16500.5
<b>Fabrication History</b>	See Page 16500.1
<b>Weld</b>	See Page 16500.5
<b>Property Measurements</b>	
Test Type . . . . .	Charpy V Impact
Specimen Type . . . . .	Full
Shear Fracture . . . . .	*
Did Specimen Split? . . . . .	*
Standard Year . . . . .	1981
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	*
Position . . . . .	0/4T
Lateral Expansion . . . . .	*
Did Specimen Fracture? . . . . .	Assumed
Standard Method . . . . .	E 23

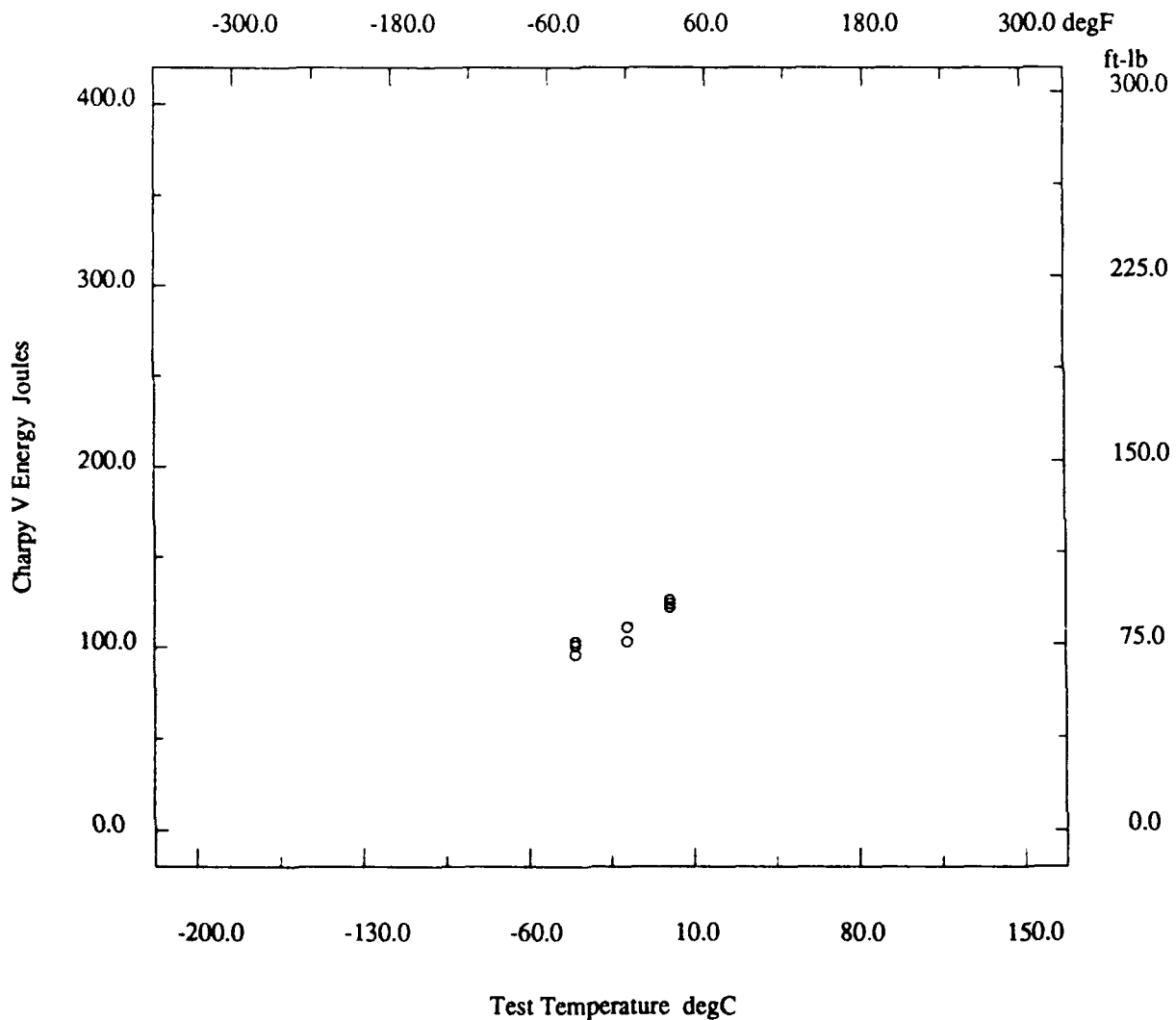
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	101
T-L °	-40	103
T-L °	-40	96
T-L °	-18	103
T-L °	-18	111
T-L °	0	122
T-L °	0	124
T-L °	0	126

# Marine Structural Toughness Data Bank

Material HY80

Page 16500.7

Description			
Material Code	001.001.09F	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,3/87		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16600.1

Description			
Material Code	001.002.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.5 in	Composition Type	Actual
Composition Position	*	Lot ID	B9353-3
Reference	1120		

Composition			
C	0.17 %	Mn	0.28 %
P	0.007 %	S	0.013 %
Si	0.20 %	Cr	1.29 %
Ni	2.48 %	Mo	0.30 %
V	0.003 %	Cu	0.18 %
Cb	*	Ti	0.003 %
B	*	Al	*
N	*	Other Components	fgp,Al %

Fabrication History			
Heat Treatment	*	Producer	Lukens
Year Produced	1977	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements			
Test Type	Fracture Toughness	Position	*
Specimen Type	*	Specimen Thickness	1.5 in
Crack Length	*	Loading Type	*
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Curve Shape	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CODi in	CODIc in	JI in-lb/in**2	Jmax in-lb/in**2	Tear Mod in-lb/in**2
L-T	72	0.0236	0.0380	4346	4315	260.2
L-T	72	0.0186	0.0349	3841	4195	306.1
T-L	72	0.0167	0.0251	2568	2923	230.8
T-L	75	0.0171	0.0253	2724	2841	218.4
S-L	72	0.0118	0.0196	1786	2098	181.7
S-L	*	0.0131	0.0220	1971	2465	229.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16600.2

<b>Description</b>			
Material Code	001.002.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.5 in	Composition Type	Actual
Composition Position	*	Lot ID	B9353-3
Reference	1120		
<b>Composition</b>		See Page 16600.1	
<b>Fabrication History</b>		See Page 16600.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	*
Specimen Type	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
L-T °	-320	6	2	5
L-T °	-255	24	12	16
L-T °	-250	23	12	11
L-T °	-240	25	15	17
L-T °	-230	33	20	24
L-T °	-220	24	15	21
L-T °	-210	27	16	27
L-T °	-200	35	26	36
L-T °	-180	46	32	42
L-T °	-160	55	40	55
L-T °	-140	61	46	72
L-T °	-120	73	55	88
L-T °	-100	79	57	95
L-T °	-80	80	62	100
L-T °	-60	83	63	100
L-T °	-40	84	64	100
L-T °	-20	88	69	100
L-T °	0	90	67	100
L-T °	20	82	62	100
L-T °	76	86	70	100
T-L △	-320	6	2	5
T-L △	-255	28	14	11
T-L △	-240	38	21	19
T-L △	-220	45	27	30
T-L △	-210	66	44	44
T-L △	-200	96	58	60
T-L △	-190	70	45	52
T-L △	-180		54	55
T-L △	-160	97	63	77
T-L △	-150	107	69	85
T-L △	-140	119	78	90
T-L △	-120	122	80	100
T-L △	-100	121	81	100
T-L △	-80	136	88	100

(continued)

\* - not reported

## Marine Structural Toughness Data Bank

Material HY80

Page 16600.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
T-L <sup>Δ</sup>	-60	130	79	100
T-L <sup>Δ</sup>	-40	140	87	100
T-L <sup>Δ</sup>	-20	139	87	100
T-L <sup>Δ</sup>	0	132	86	100
T-L <sup>Δ</sup>	20	136	88	100
T-L <sup>Δ</sup>	76	137	90	100

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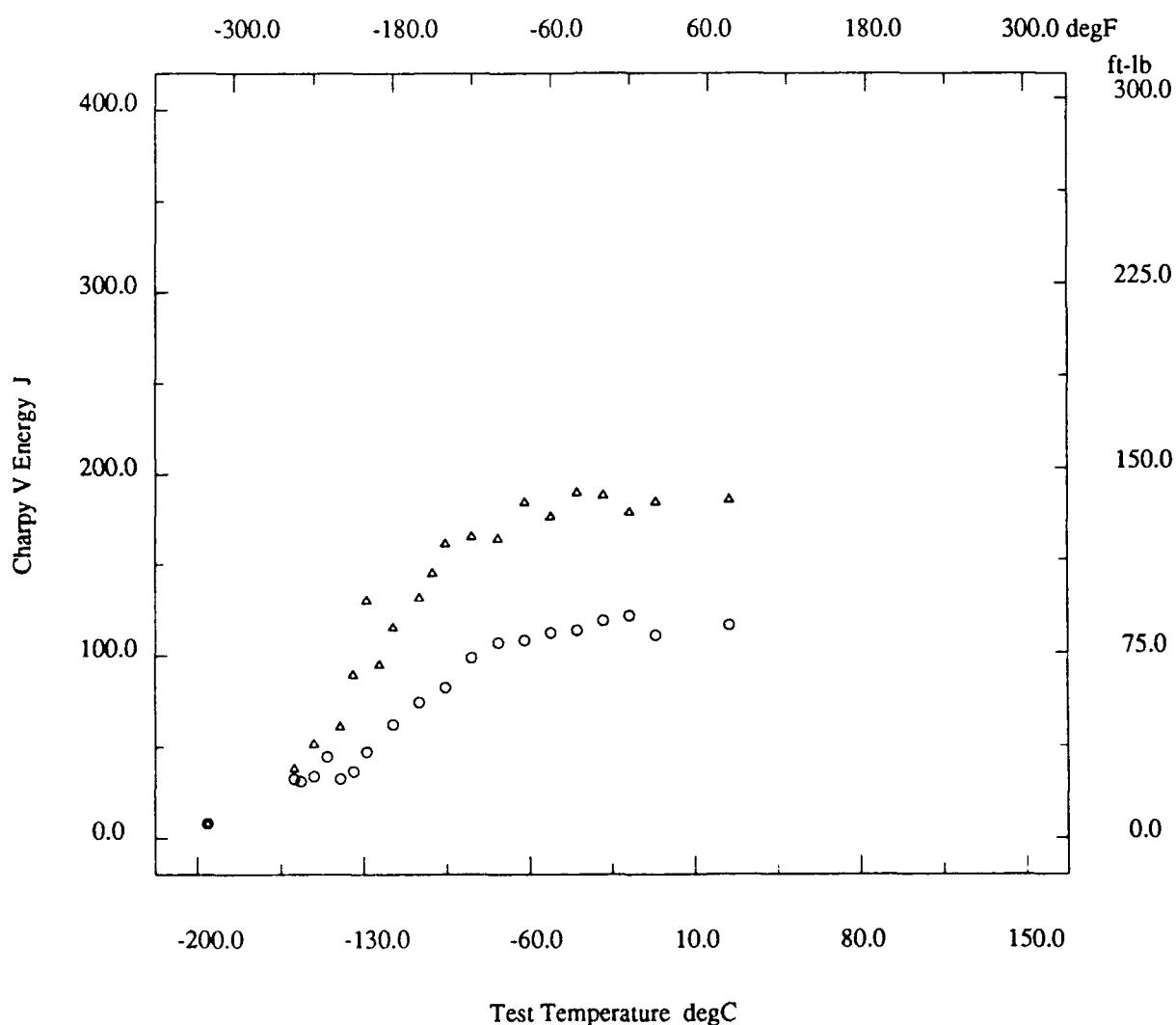
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# Marine Structural Toughness Data Bank

Material HY80

Page 16600.4

<b>Description</b>			
Material Code	001.002.01	Material Name	HY80
UNS	*	Other Designation	*
Temper	Wrought Metal	Form	Plate
Thickness	1.5 in	Composition Type	Actual
Composition Position	*	Lot ID	B9353-3
Reference	1120		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16600.5

<b>Description</b>		
Material Code	001.002.01	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	1.5 in	Composition Type Actual
Composition Position	*	Lot ID B9353-3
Reference	1120	

**Composition** See Page 16600.1

**Fabrication History** See Page 16600.1

<b>Property Measurements</b>		
Test Type	Tensile	Position *
Specimen Type	*	Specimen Thickness *
Gage Length	*	Loading Rate *
Tensile Strength Offset	*	Tensile Yield Point *
Uniform Elongation	*	Tensile Modulus *
Standard Method	*	Standard Year *

Orient	Test Temp degF	UTS ksi	TYS ksi	Elongation %	RA %
L	80	106.8	92.2	23.8	72.1
L	80	106.8	93.2	23.7	72.1
T	80	106.8	86.7	24.3	76.6
T	80	107.3	90.7	23.9	75.4

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 16600.6

<b>Description</b>			
Material Code	001.002.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.5 in	Composition Type	Actual
Composition Position	*	Lot ID	B9353-3
Reference	1120		

**Composition** See Page 16600.1

**Fabrication History** See Page 16600.1

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	*
Specimen Type	Dynamic Tear	Notch Preparation	*
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-225	35	5
L-T ○	-200	40	14
L-T ○	-175	100	22
L-T ○	-150	215	33
L-T ○	-125	265	42
L-T ○	-110	515	69
L-T ○	-100	570	79
L-T ○	-75	690	99
L-T ○	-50	695	100
L-T ○	-25	720	100
T-L ▲	-225	30	10
T-L ▲	-200	40	13
T-L ▲	-175	95	22
T-L ▲	-150	260	38
T-L ▲	-135	510	52
T-L ▲	-125	635	64
T-L ▲	-100	860	77
T-L ▲	-75	1100	88
T-L ▲	-50	1390	100
T-L ▲	-25	1400	100

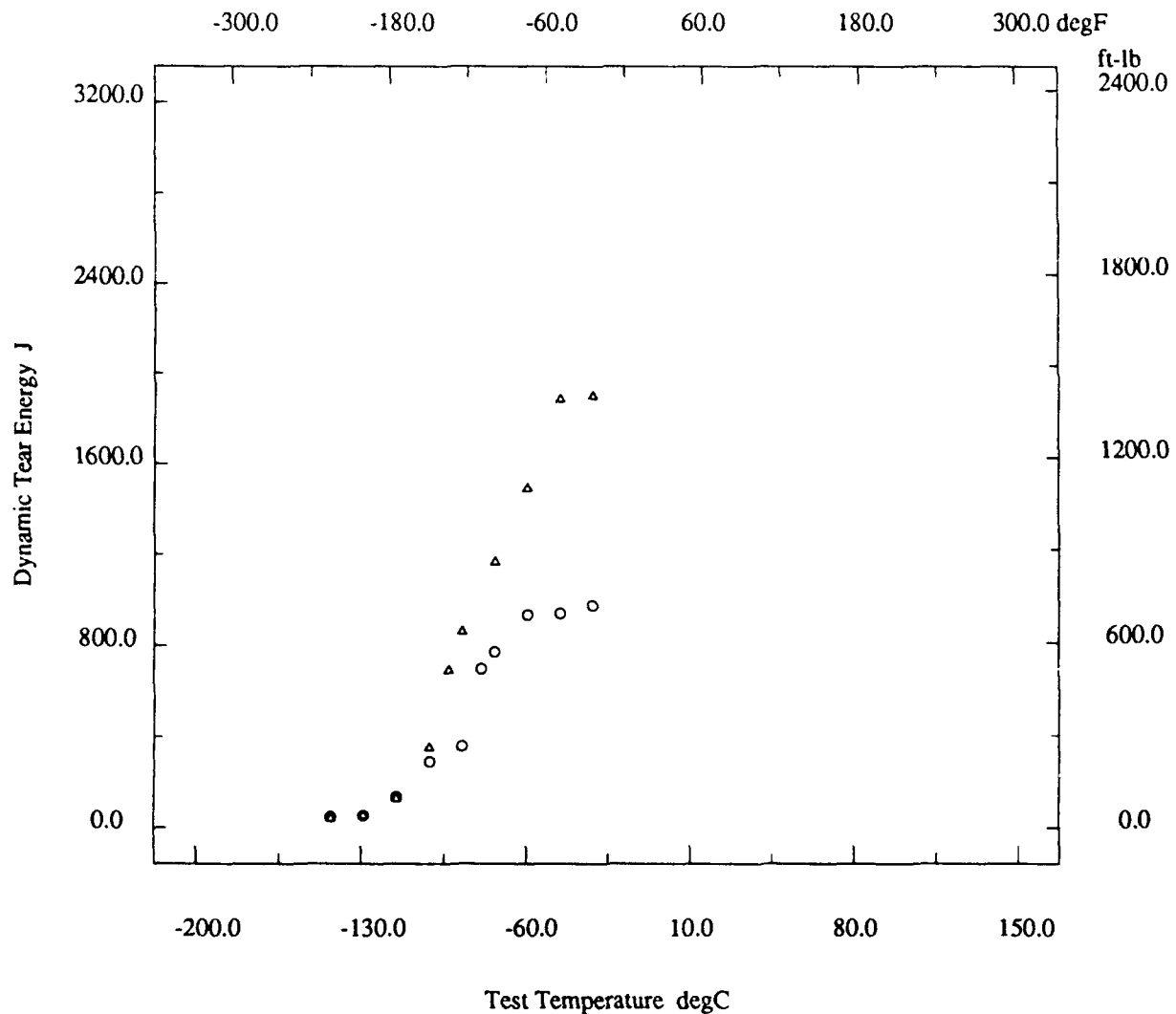
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16600.7

Description			
Material Code	001.002.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.5 in	Composition Type	Actual
Composition Position	*	Lot ID	B9353-3
Reference	1120		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.1

<b>Description</b>							
Material Code	001.003.01T1	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	8 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	B8740-3				
Reference	USN-1						
<b>Composition</b>							
C	0.16 %	Mn	0.27 %				
P	0.007 %	S	0.007 %				
Si	0.24 %	Cr	1.48 %				
Ni	2.83 %	Mo	0.40 %				
V	0.01 %	Cu	0.11 %				
Cb	*	Ti	0.003 %				
B	*	Al	0.039 %				
N	*	Other Components	As=.008; Sb=.003 %				
<b>Fabrication History</b>							
Heat Treatment	A,Q,T	Producer	*				
Year Produced	1982	Addl Info	No				
Source	*	Melting Practice	*				
Ingot Position	Top	Killing Process	*				
Process Temperature	1650 degF	Process Time	8 hr				
Rolling Conditions	78 %	Final Processing	A,Q,T				
Final Temperature	1180 degF	Final Time	8.25 hr				
Cold Work Strain	*	Aging Temperature	*				
Aging Time	*	Location	*				
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	100.0	82.5	*	23	67.0	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.2

Description			
Material Code	001.003.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		
Composition		See Page 16700.1	
Fabrication History		See Page 16700.1	
Property Measurements			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	80
L-T °	-120	84
L-T °	-120	84
L-T °	-120	86
L-T °	-120	90
L-T °	-40	114
L-T °	-40	118
L-T °	-40	120
L-T °	-40	126
L-T °	-40	128
L-T °	0	126
L-T °	0	134
L-T °	0	150
L-T °	0	154
L-T °	0	154
L-T °	32	152
L-T °	32	154
L-T °	32	154
L-T °	32	156
L-T °	32	158
L-T °	70	142
L-T °	70	150
L-T °	70	152
L-T °	70	152
L-T °	70	160
T-L ▲	-120	52
T-L ▲	-120	56
T-L ▲	-120	58
T-L ▲	-120	72
T-L ▲	-120	74
T-L ▲	-40	106
T-L ▲	-40	118
T-L ▲	-40	88

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	97
T-L Δ	-40	98
T-L Δ	0	118
T-L Δ	0	120
T-L Δ	0	132
T-L Δ	0	92
T-L Δ	0	94
T-L Δ	32	120
T-L Δ	32	124
T-L Δ	32	126
T-L Δ	32	134
T-L Δ	32	134
T-L Δ	70	121
T-L Δ	70	128
T-L Δ	70	128
T-L Δ	70	132
T-L Δ	70	134

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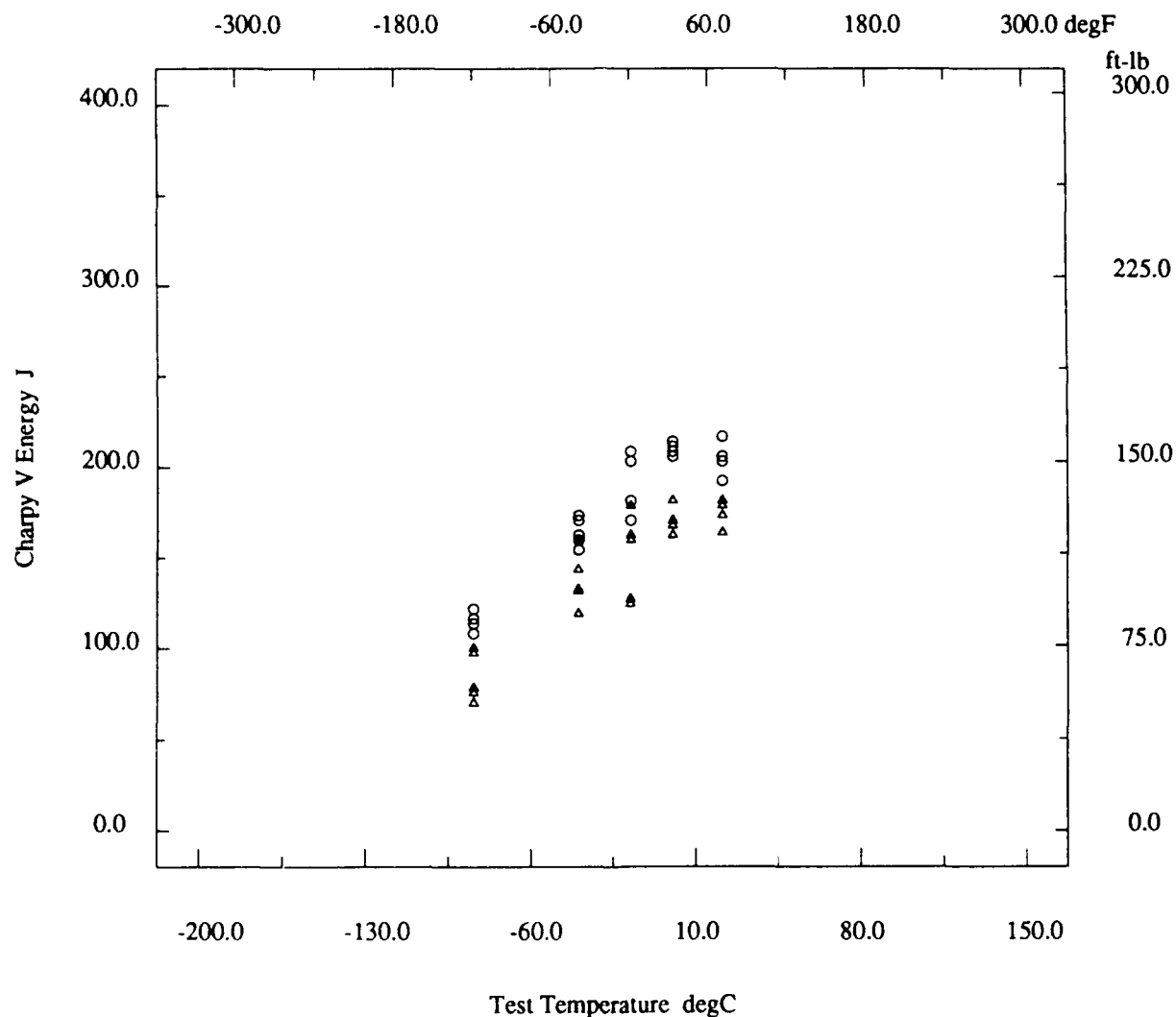
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# Marine Structural Toughness Data Bank

Material HY80

Page 16700.4

Description			
Material Code	001.003.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.5

<b>Description</b>						
Material Code	001.003.01TM					
UNS	*					
Type	Wrought Metal					
Thickness	8 in					
Composition Position	Ladle					
Reference	USN-1					
<b>Composition</b>						
See Page 16700.1						
<b>Fabrication History</b>						
See Page 16700.1						
<b>Property Measurements</b>						
Test Type	Tensile					
Specimen Type	*					
Gage Length	*					
Tensile Strength Offset	*					
Tensile Modulus	*					
Standard Year	*					
Position	1/4T					
Specimen Thickness	*					
Loading Rate	*					
Uniform Elongation	*					
Standard Method	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	102.5	82.8	*	24	70.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.6

<b>Description</b>			
Material Code	001.003.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		
<b>Composition</b>		See Page 16700.1	
<b>Fabrication History</b>		See Page 16700.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L o	-120	64
T-L o	-120	64
T-L o	-120	70
T-L o	0	110
T-L o	0	112
T-L o	0	118

\* - not reported

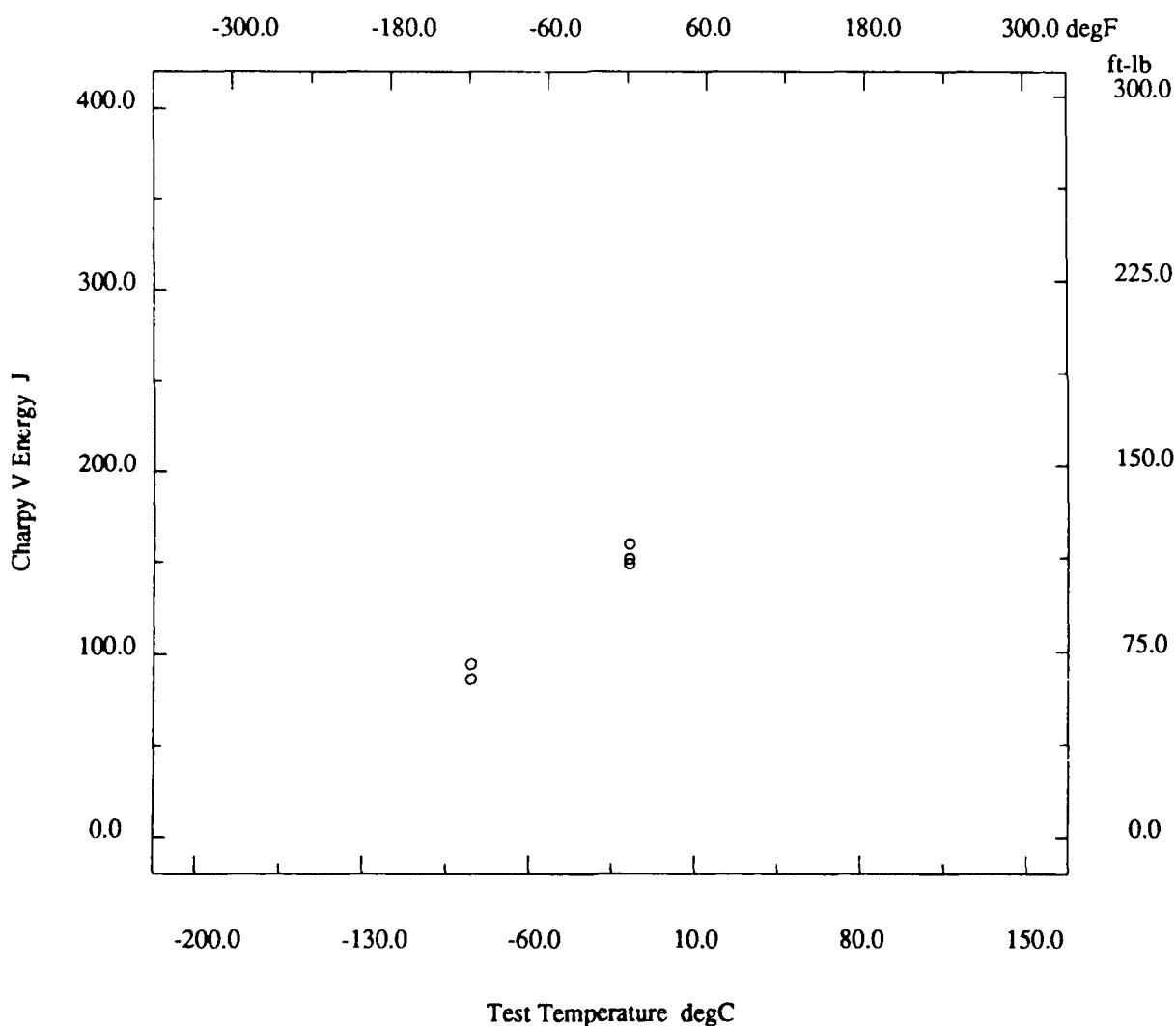


# Marine Structural Toughness Data Bank

Material HY80

Page 16700.7

Description			
Material Code	001.003.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.8

<b>Description</b>							
Material Code	001.003.01T2	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	8 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	B8740-3				
Reference	USN-1						
<b>Composition</b>		See Page 16700.1					
<b>Fabrication History</b>		See Page 16700.1					
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	105.5	86.5	*	23	73.3	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.9

<b>Description</b>			
Material Code	001.003.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		
<b>Composition</b>		See Page 16700.1	
<b>Fabrication History</b>		See Page 16700.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	50
T-L ◊	-120	50
T-L ◊	-120	58
T-L ◊	0	112
T-L ◊	0	124
T-L ◊	0	130

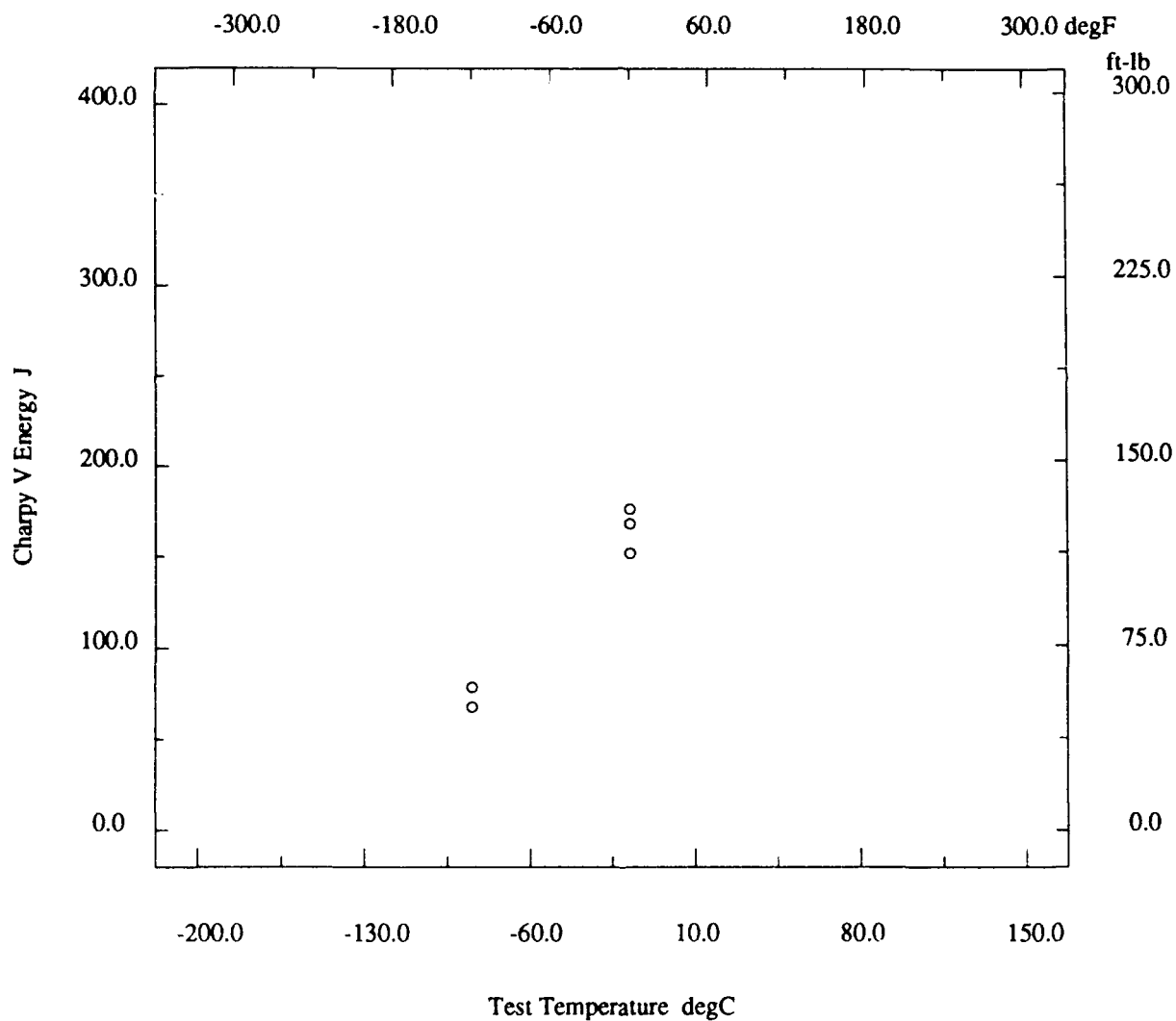
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# Marine Structural Toughness Data Bank

Material HY80

Page 16700.10

Description			
Material Code	001.003.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.11

<b>Description</b>	
Material Code .....	001.003.01M1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	8 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	B8740-3
Reference .....	USN-1
<b>Composition</b> See Page 16700.1	
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Producer .....	*
Year Produced .....	1982
Addl Info .....	No
Source .....	*
Melting Practice .....	*
Ingot Position .....	Mid
Killing Process .....	*
Process Temperature .....	1650 degF
Process Time .....	8 hr
Rolling Conditions .....	78 %
Final Processing .....	A,Q,T
Final Temperature .....	1180 degF
Final Time .....	8.25 hr
Cold Work Strain .....	*
Aging Temperature .....	*
Aging Time .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Position .....	1/4T
Specimen Type .....	*
Specimen Thickness .....	*
Gage Length .....	*
Loading Rate .....	*
Tensile Strength Offset .....	*
Uniform Elongation .....	*
Tensile Modulus .....	*
Standard Method .....	*
Standard Year .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	103.0	85.1	*	23	74.4

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.12

<b>Description</b>		
Material Code	001.003.01M1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	8 in	Composition Type Actual
Composition Position	Ladle	Lot ID B8740-3
Reference	USN-1	
<b>Composition</b>		See Page 16700.1
<b>Fabrication History</b>		See Page 16700.11
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	52
T-L °	-120	56
T-L °	-120	60
T-L °	0	78
T-L °	0	78
T-L °	0	90

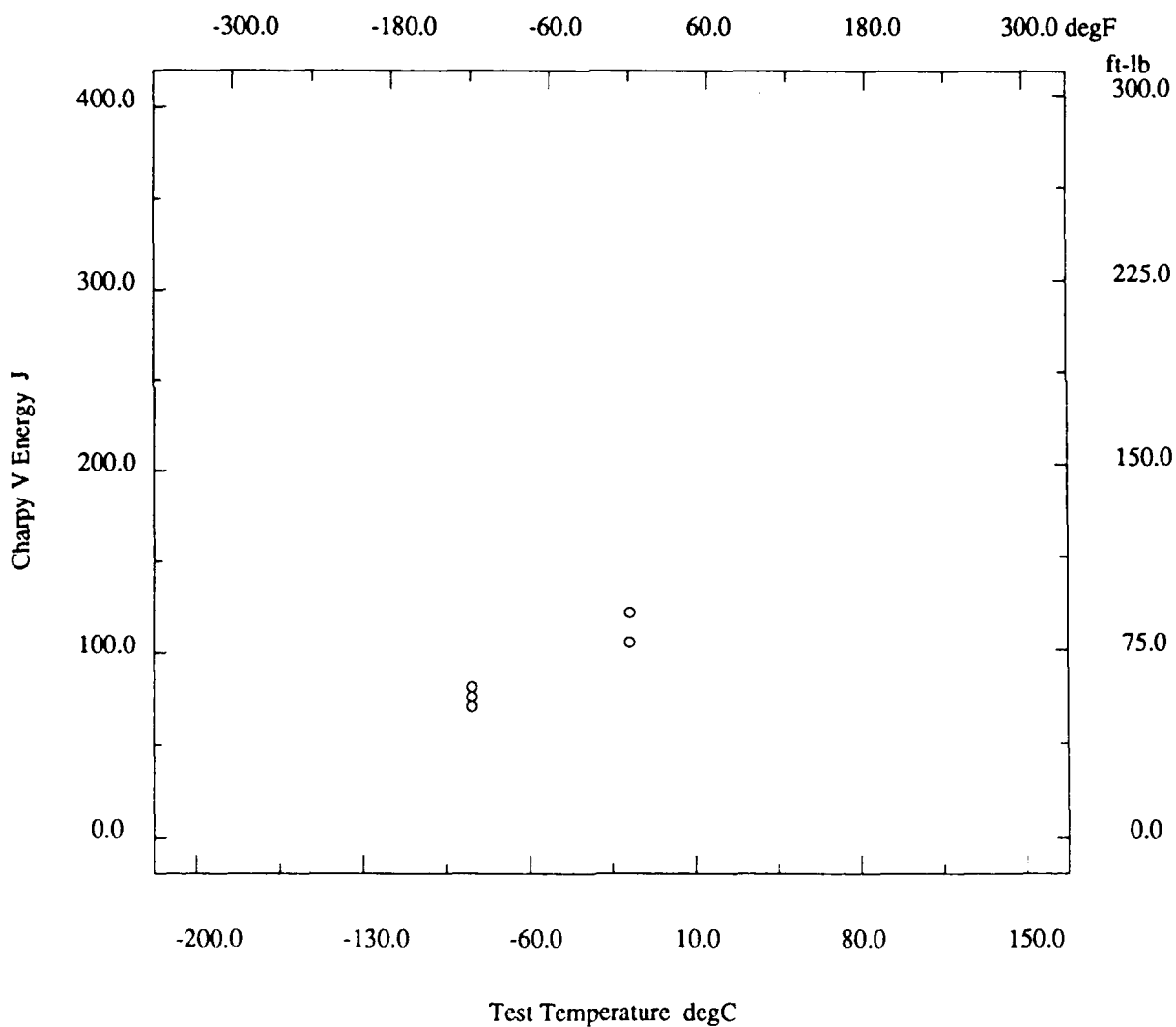
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# Marine Structural Toughness Data Bank

Material HY80

Page 16700.13

Description			
Material Code	001.003.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.14

<b>Description</b>						
Material Code	001.003.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	8 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-3			
Reference	USN-1					
<b>Composition</b>		See Page 16700.1				
<b>Fabrication History</b>		See Page 16700.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	104.1	84.2	*	23	67.5

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 16700.15

<b>Description</b>			
Material Code	001.003.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		

<b>Composition</b>	See Page 16700.1
--------------------	------------------

<b>Fabrication History</b>	See Page 16700.11
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ○	-120	40
T-L ○	-120	40
T-L ○	-120	48
T-L ○	0	76
T-L ○	0	80
T-L ○	0	84

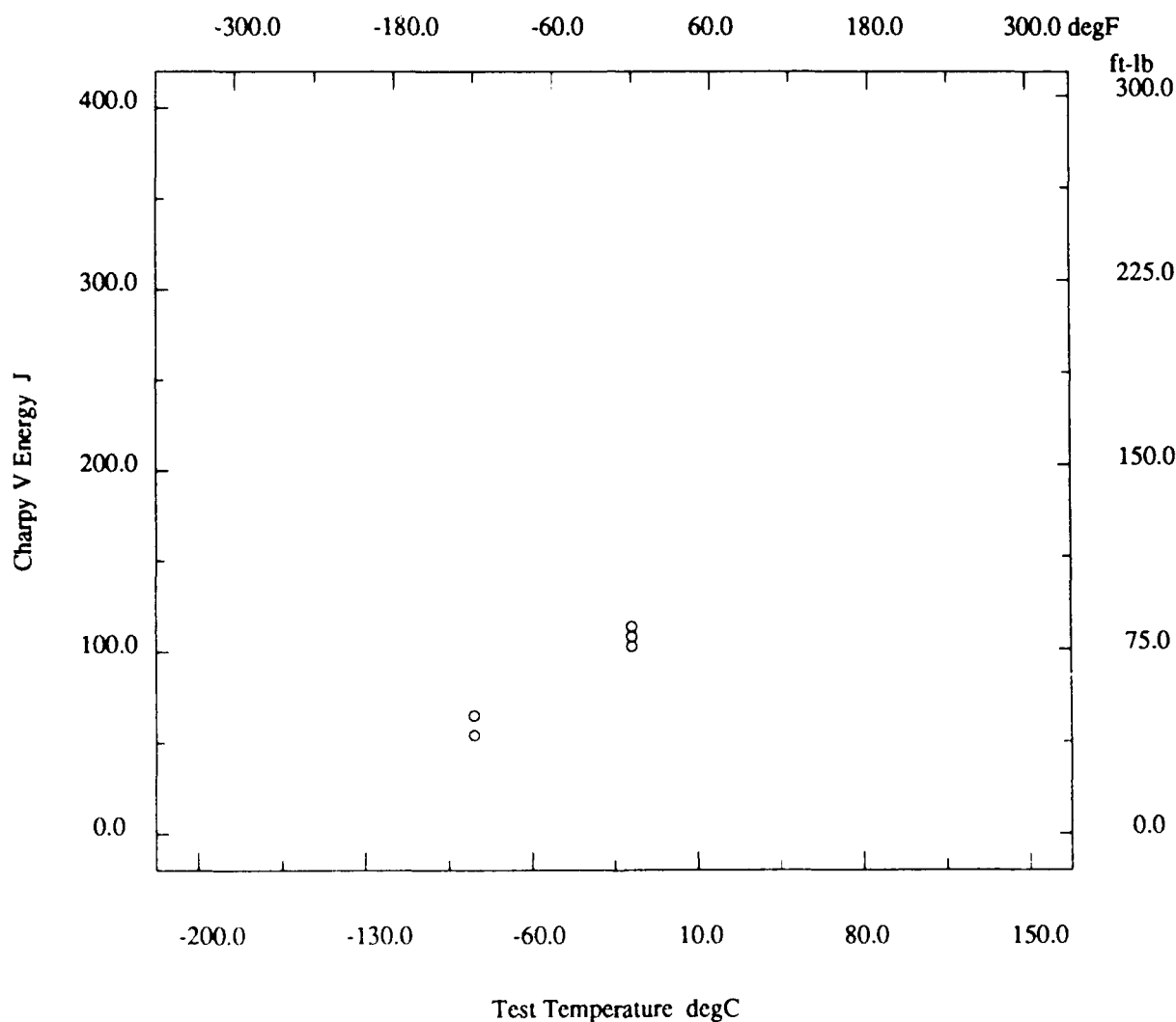
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# Marine Structural Toughness Data Bank

Material HY80

Page 16700.16

Description			
Material Code	001.003.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.17

<b>Description</b>						
Material Code	001.003.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	8 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-3			
Reference	USN-1					
<b>Composition</b>		See Page 16700.1				
<b>Fabrication History</b>		See Page 16700.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	104.5	84.3	*	22	71.4

\* - not reported

65

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.18

<b>Description</b>	
Material Code . . . . .	001.003.01M2
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	8 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	B8740-3
<b>Composition</b>	
See Page 16700.1	
<b>Fabrication History</b>	
See Page 16700.11	
<b>Property Measurements</b>	
Test Type . . . . .	Charpy V Impact
Specimen Type . . . . .	Full
Shear Fracture . . . . .	*
Did Specimen Split? . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Lateral Expansion . . . . .	*
Did Specimen Fracture? . . . . .	Assumed
Standard Method . . . . .	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	42
T-L ◦	-120	44
T-L ◦	-120	48
T-L ◦	0	78
T-L ◦	0	90
T-L ◦	0	96

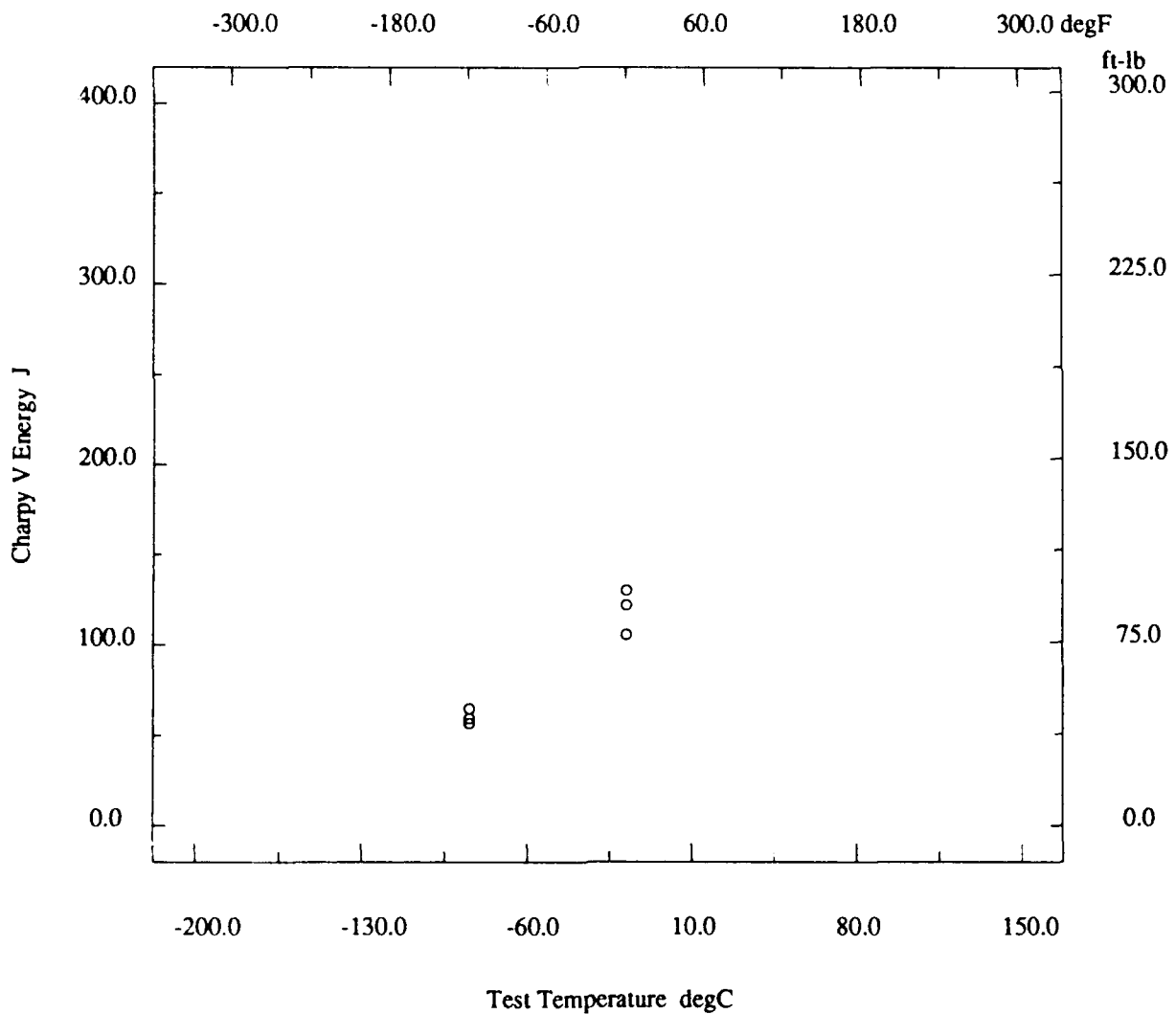
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.19

Description			
Material Code	001.003.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.20

<b>Description</b>	
Material Code . . . . . 001.003.01B1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 8 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . B8740-3
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 16700.1	
<b>Fabrication History</b>	
Heat Treatment . . . . . A,Q,T	Producer . . . . . *
Year Produced . . . . . 1982	Addl Info . . . . . No
Source . . . . . *	Melting Practice . . . . . *
Ingot Position . . . . . Bottom	Killing Process . . . . . *
Process Temperature . . . . . 1650 degF	Process Time . . . . . 8 hr
Rolling Conditions . . . . . 78 %	Final Processing . . . . . A,Q,T
Final Temperature . . . . . 1180 degF	Final Time . . . . . 8.25 hr
Cold Work Strain . . . . . *	Aging Temperature . . . . . *
Aging Time . . . . . *	Location . . . . . *
<b>Property Measurements</b>	
Test Type . . . . . Tensile	Position . . . . . 1/4T
Specimen Type . . . . . *	Specimen Thickness . . . . . *
Gage Length . . . . . *	Loading Rate . . . . . *
Tensile Strength Offset . . . . . *	Uniform Elongation . . . . . *
Tensile Modulus . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	101.5	83.4	*	23	72.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.21

<b>Description</b>	
Material Code .....	001.003.01B1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	8 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	B8740-3
Reference .....	USN-1
<b>Composition</b>	See Page 16700.1
<b>Fabrication History</b>	See Page 16700.20
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	40
T-L ◊	-120	42
T-L ◊	-120	58
T-L ◊	0	100
T-L ◊	0	108
T-L ◊	0	94

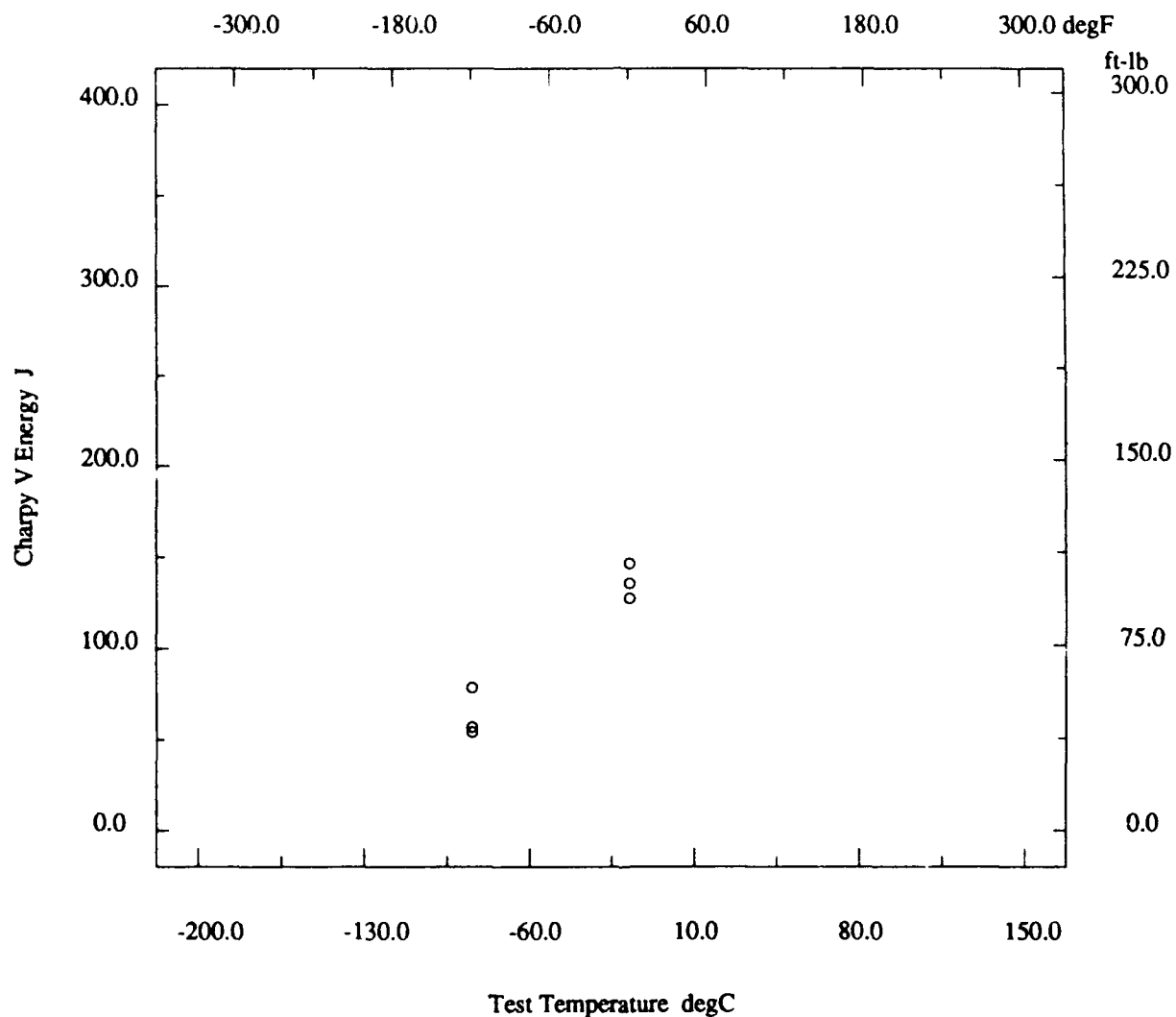
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.22

Description			
Material Code	001.003.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 16700.23

<b>Description</b>						
Material Code	001.003.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	8 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-3			
Reference	USN-1					
<b>Composition</b>		See Page 16700.1				
<b>Fabrication History</b>		See Page 16700.20				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	103.5	83.3	*	22	70.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.24

<b>Description</b>	
Material Code . . . . .	001.003.01BM
Material Name . . . . .	HY80
UNS . . . . .	*
Other Designation . . . . .	*
Type . . . . .	Wrought Metal
Form . . . . .	Plate
Thickness . . . . .	8 in
Composition Type . . . . .	Actual
Composition Position . . . . .	Ladle
Lot ID . . . . .	B8740-3
Reference . . . . .	USN-1
<b>Composition</b>	
See Page 16700.1	
<b>Fabrication History</b>	
See Page 16700.20	
<b>Property Measurements</b>	
Test Type . . . . .	Charpy V Impact
Position . . . . .	1/4T
Specimen Type . . . . .	Full
Lateral Expansion . . . . .	*
Shear Fracture . . . . .	*
Did Specimen Fracture? . . . . .	Assumed
Did Specimen Split? . . . . .	*
Standard Method . . . . .	*
Standard Year . . . . .	*

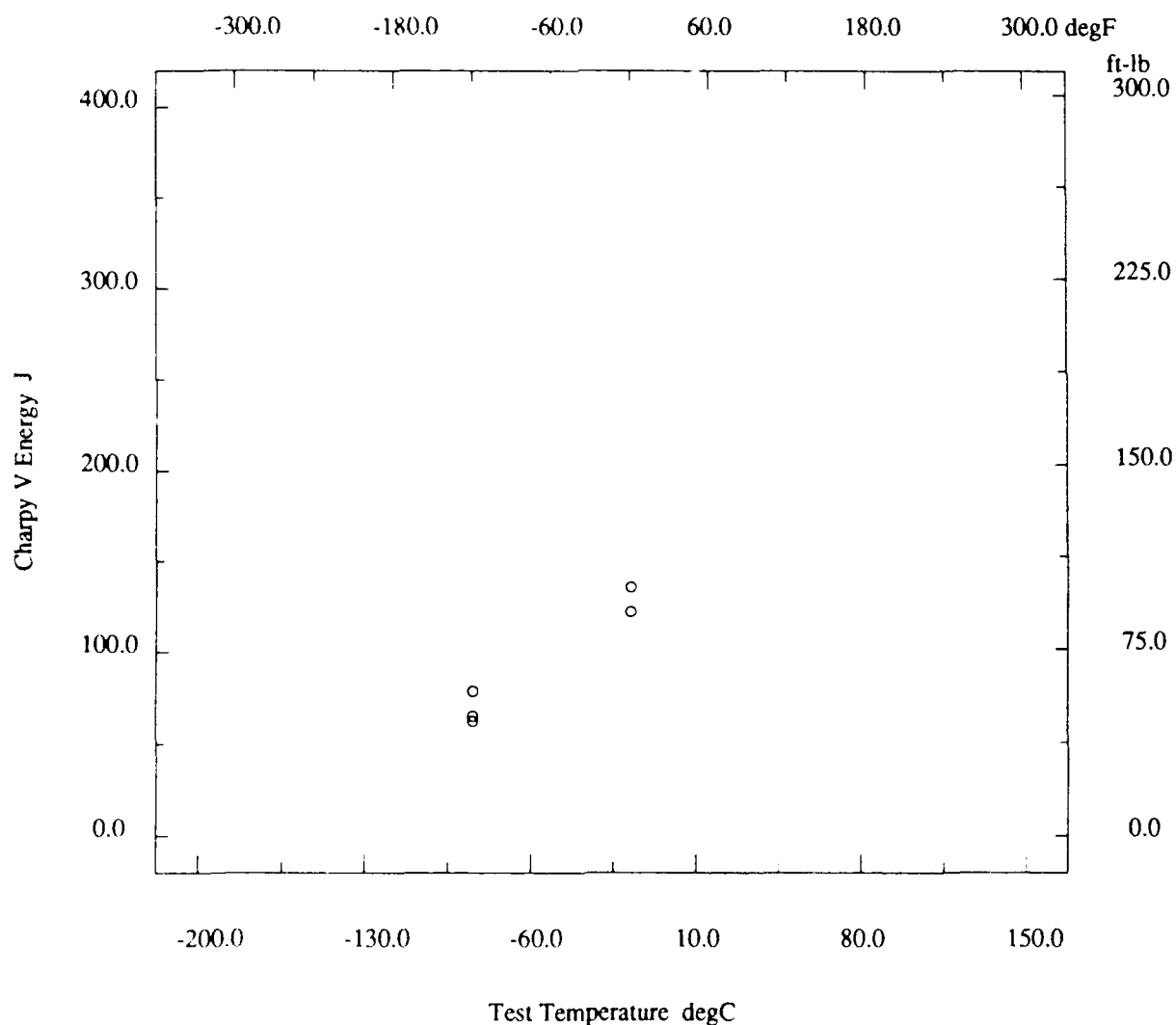
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-120	46
T-L ◯	-120	48
T-L ◯	-120	58
T-L ◯	0	100
T-L ◯	0	100
T-L ◯	0	90

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.25

Description			
Material Code	001.003.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.26

<b>Description</b>						
Material Code	001.003.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	8 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-3			
Reference	USN-1					
<b>Composition</b>		See Page 16700.1				
<b>Fabrication History</b>		See Page 16700.20				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	103.5	85.3	*	24	71.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.27

<b>Description</b>		
Material Code	001.003.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	8 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8740-3

**Composition** See Page 16700.1

**Fabrication History** See Page 16700.20

## Property Measurements

Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-120	58
T-L ◯	-120	58
T-L ◯	-120	60
T-L ◯	0	108
T-L ◯	0	112
T-L ◯	0	118

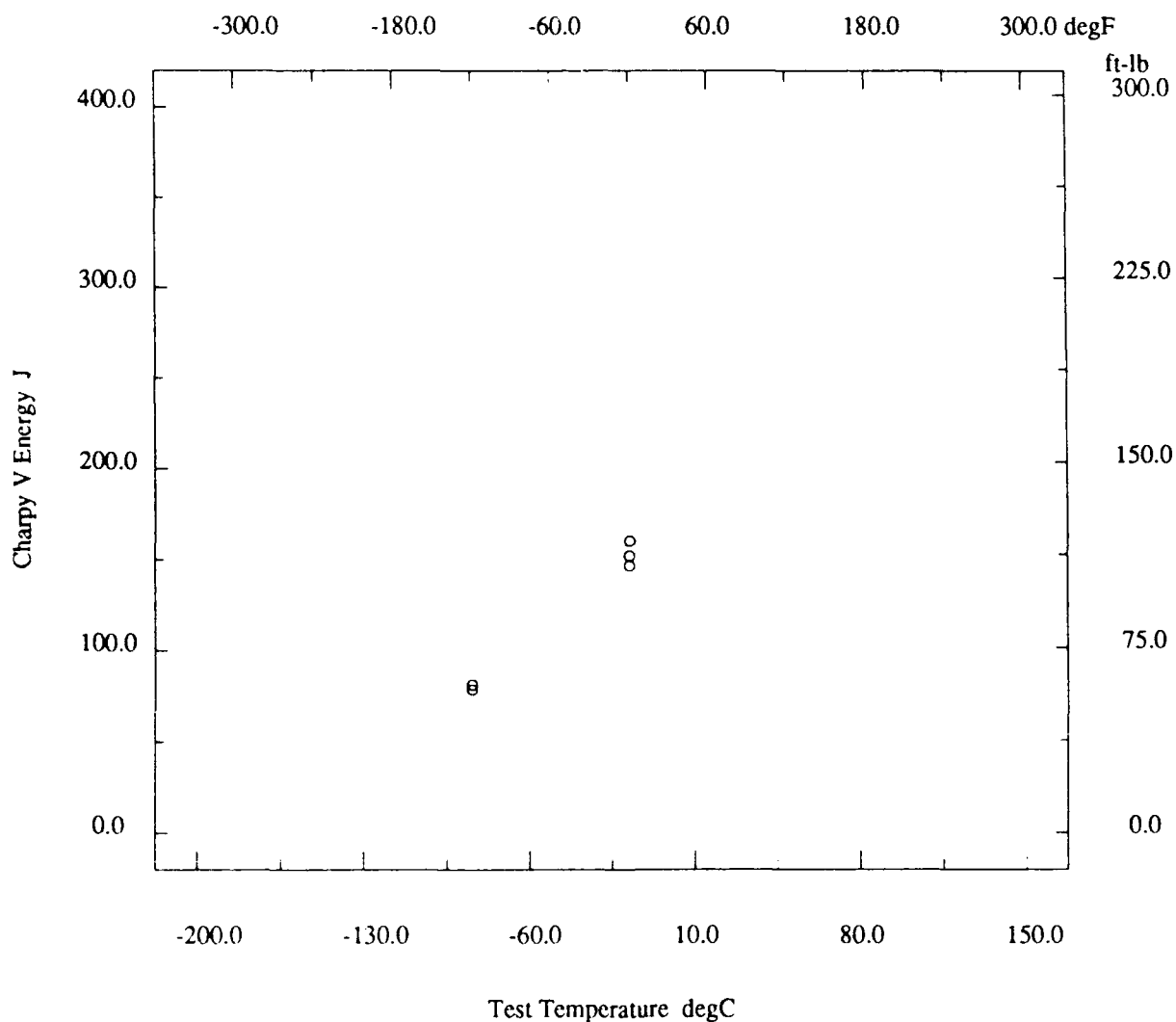
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16700.28

Description			
Material Code	001.003.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	8 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16800.1

<b>Description</b>						
Material Code	001.004.01T1					
UNS	*					
Type	Wrought Metal					
Thickness	1.75 in					
Composition Position	Ladle					
Reference	USN-1					
<b>Composition</b>						
C	0.16 %					
P	0.006 %					
Si	0.23 %					
Ni	2.72 %					
V	0.01 %					
Cb	*					
B	*					
N	*					
Mn	0.28 %					
S	0.013 %					
Cr	1.44 %					
Mo	0.38 %					
Cu	0.15 %					
Ti	0.002 %					
Al	0.024 %					
Other Components	As=0.005;Sn=0.007;Sb=0.007 %					
<b>Fabrication History</b>						
Heat Treatment	A,Q,T					
Year Produced	1982					
Source	*					
Ingot Position	Top					
Process Temperature	1600 degF					
Rolling Conditions	80 %					
Final Temperature	1300 degF					
Cold Work Strain	*					
Aging Time	*					
Producer	*					
Addl Info	No					
Melting Practice	*					
Killing Process	*					
Process Time	1.76 hr					
Final Processing	A,Q,T					
Final Time	1.82 hr					
Aging Temperature	*					
Location	*					
<b>Property Measurements</b>						
Test Type	Tensile					
Specimen Type	*					
Gage Length	*					
Tensile Strength Offset	*					
Tensile Modulus	*					
Standard Year	*					
Position	1/4T					
Specimen Thickness	*					
Loading Rate	*					
Uniform Elongation	*					
Standard Method	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	99.5	82.8	*	25	73.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16800.2

Description		
Material Code	001.004.01T1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	1.75 in	Composition Type Actual
Composition Position	Ladle	Lot ID D3703-4B
Reference	USN-1	

**Composition** See Page 16800.1

**Fabrication History** See Page 16800.1

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	144
L-T °	-120	147
L-T °	-120	148
L-T °	-120	152
L-T °	-120	152
L-T °	-40	148
L-T °	-40	160
L-T °	-40	162
L-T °	-40	168
L-T °	-40	174
L-T °	0	159
L-T °	0	160
L-T °	0	164
L-T °	0	168
L-T °	0	181
L-T °	32	161
L-T °	32	162
L-T °	32	168
L-T °	32	175
L-T °	32	178
L-T °	70	169
L-T °	70	172
L-T °	70	178
L-T °	70	182
L-T °	70	184
T-L ^	-120	75
T-L ^	-120	77
T-L ^	-120	77
T-L ^	-120	79
T-L ^	-120	81
T-L ^	-40	102
T-L ^	-40	74
T-L ^	-40	90

(continued)

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 16800.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	96
T-L Δ	-40	98
T-L Δ	0	112
T-L Δ	0	113
T-L Δ	0	115
T-L Δ	0	85
T-L Δ	0	89
T-L Δ	32	100
T-L Δ	32	104
T-L Δ	32	116
T-L Δ	32	119
T-L Δ	32	121
T-L Δ	70	102
T-L Δ	70	110
T-L Δ	70	116
T-L Δ	70	121
T-L Δ	70	128

\* - not reported

# Marine Structural Toughness Data Bank

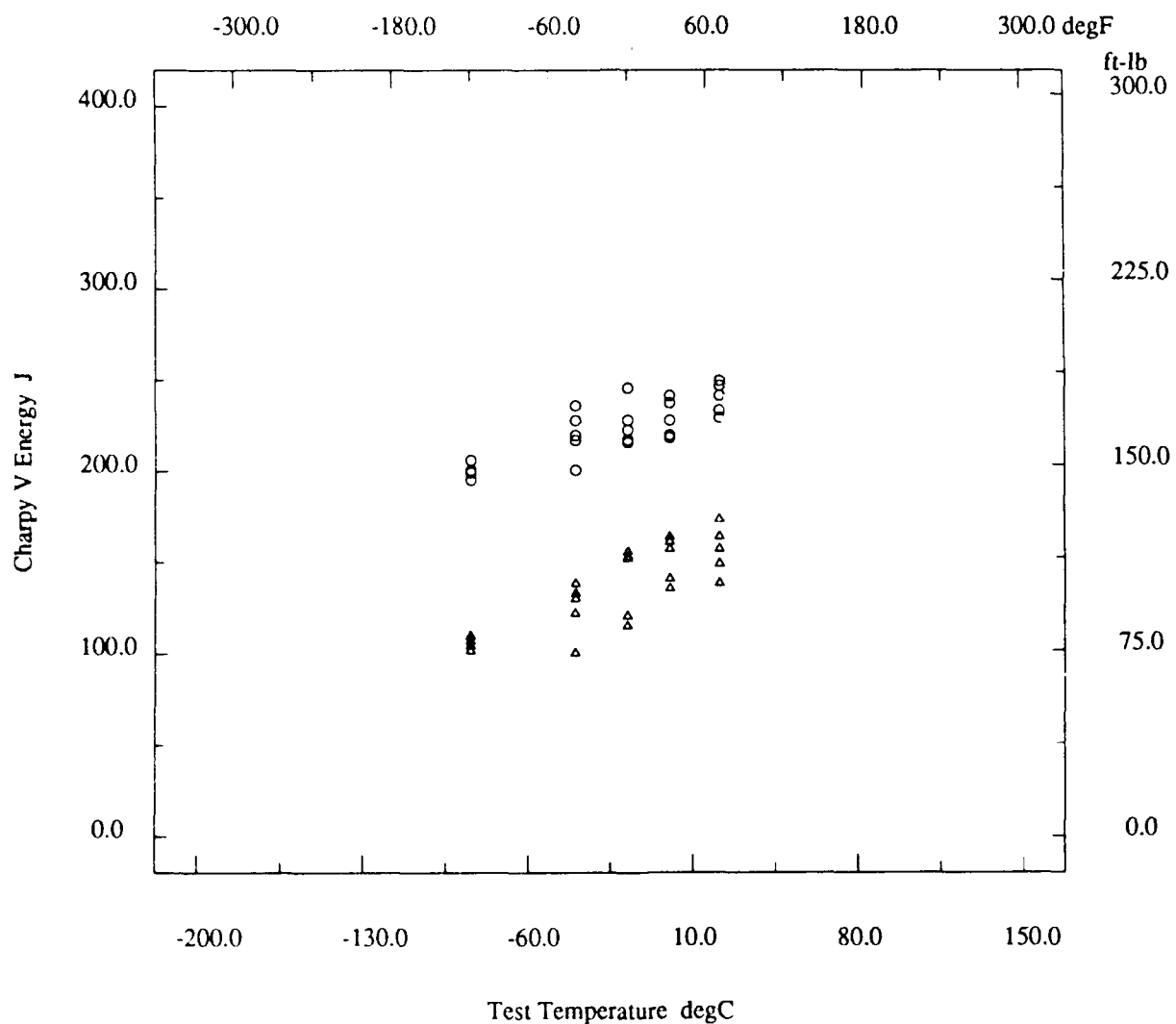
Material HY80

Page 16800.4

## Description

Material Code ..... 001.004.01T1  
 UNS ..... \*  
 Type ..... Wrought Metal  
 Thickness ..... 1.75 in  
 Composition Position ..... Ladle  
 Reference ..... USN-1

Material Name ..... HY80  
 Other Designation ..... \*  
 Form ..... Plate  
 Composition Type ..... Actual  
 Lot ID ..... D3703-4B



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16800.5

<b>Description</b>	
Material Code .....	001.004.01B2
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	1.75 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D3703-4B
Reference .....	USN-1
<b>Composition</b>	See Page 16800.1
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Producer .....	*
Year Produced .....	1982
Addl Info .....	No
Source .....	*
Melting Practice .....	*
Ingot Position .....	Bottom
Killing Process .....	*
Process Temperature .....	1600 degF
Process Time .....	1.76 hr
Rolling Conditions .....	80 %
Final Processing .....	A,Q,T
Final Temperature .....	1300 degF
Final Time .....	1.82 hr
Cold Work Strain .....	*
Aging Temperature .....	*
Aging Time .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Position .....	1/4T
Specimen Type .....	*
Specimen Thickness .....	*
Gage Length .....	*
Loading Rate .....	*
Tensile Strength Offset .....	*
Uniform Elongation .....	*
Tensile Modulus .....	*
Standard Method .....	*
Standard Year .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	101.0	82.9	*	25	70.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16800.6

<b>Description</b>		
Material Code	001.004.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3703-4B
<b>Composition</b>		See Page 16800.1
<b>Fabrication History</b>		See Page 16800.5
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

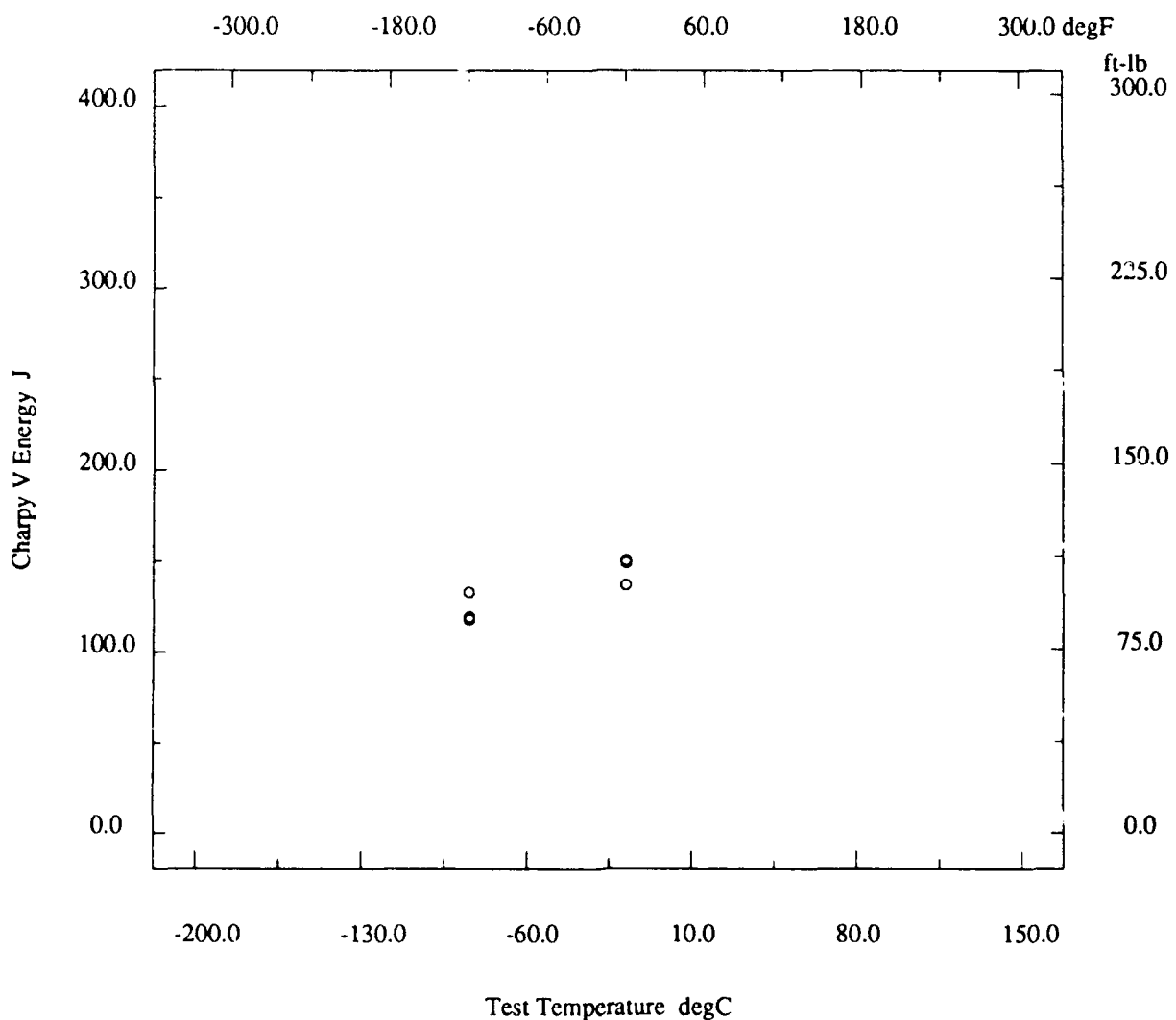
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	87
T-L ◊	-120	88
T-L ◊	-120	98
T-L ◊	0	101
T-L ◊	0	110
T-L ◊	0	111

# Marine Structural Toughness Data Bank

Material HY80

Page 16800.7

Description			
Material Code	001.004.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3703-4B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16900.1

<b>Description</b>						
Material Code	001.005.01T1					
UNS	*					
Type	Wrought Metal					
Thickness	1 in					
Composition Position	Ladle					
Reference	USN-1					
<b>Material Name</b> HY80						
<b>Other Designation</b> *						
<b>Form</b> Plate						
<b>Composition Type</b> Actual						
<b>Lot ID</b> D3631-7L						
<b>Composition</b>						
C	0.15 %					
P	0.005 %					
Si	0.23 %					
Ni	2.37 %					
V	0.01 %					
Cb	*					
B	*					
N	*					
Mn	0.30 %					
S	0.017 %					
Cr	1.35 %					
Mo	0.30 %					
Cu	0.13 %					
Ti	0.003 %					
Al	0.025 %					
Other Components As=0.008;Sn=0.011;Sb=0.007 %						
<b>Fabrication History</b>						
Heat Treatment	A,Q,T					
Year Produced	1982					
Source	*					
Ingot Position	Top					
Process Temperature	1600 degF					
Rolling Conditions	74 %					
Final Temperature	1280 degF					
Cold Work Strain	*					
Aging Time	*					
Producer	*					
Addl Info	No					
Melting Practice	*					
Killing Process	*					
Process Time	1.95 hr					
Final Processing	A,Q,T					
Final Time	1.05 hr					
Aging Temperature	*					
Location	*					
<b>Property Measurements</b>						
Test Type	Tensile					
Specimen Type	*					
Gage Length	*					
Tensile Strength Offset	*					
Tensile Modulus	*					
Standard Year	*					
Position	1/4T					
Specimen Thickness	*					
Loading Rate	*					
Uniform Elongation	*					
Standard Method	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	110.6	98.0	*	22	63.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16900.2

<b>Description</b>	
Material Code .....	001.005.01T1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	1 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D3631-7L
Reference .....	USN-1
<b>Composition</b> See Page 16900.1	
<b>Fabrication History</b> See Page 16900.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	102
L-T °	-120	102
L-T °	-120	103
L-T °	-120	108
L-T °	-120	112
L-T °	-40	102
L-T °	-40	108
L-T °	-40	110
L-T °	-40	112
L-T °	-40	126
L-T °	0	112
L-T °	0	112
L-T °	0	112
L-T °	0	116
L-T °	0	120
L-T °	32	122
L-T °	32	122
L-T °	32	126
L-T °	32	129
L-T °	32	130
L-T °	70	118
L-T °	70	118
L-T °	70	128
L-T °	70	132
L-T °	70	136
T-L △	-120	56
T-L △	-120	62
T-L △	-120	62
T-L △	-120	68
T-L △	-120	69
T-L △	-40	70
T-L △	-40	70
T-L △	-40	78

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16900.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	79
T-L Δ	-40	79
T-L Δ	0	71
T-L Δ	0	72
T-L Δ	0	75
T-L Δ	0	78
T-L Δ	0	80
T-L Δ	32	60
T-L Δ	32	68
T-L Δ	32	72
T-L Δ	32	80
T-L Δ	32	80
T-L Δ	70	68
T-L Δ	70	68
T-L Δ	70	76
T-L Δ	70	80
T-L Δ	70	82

\* - not reported

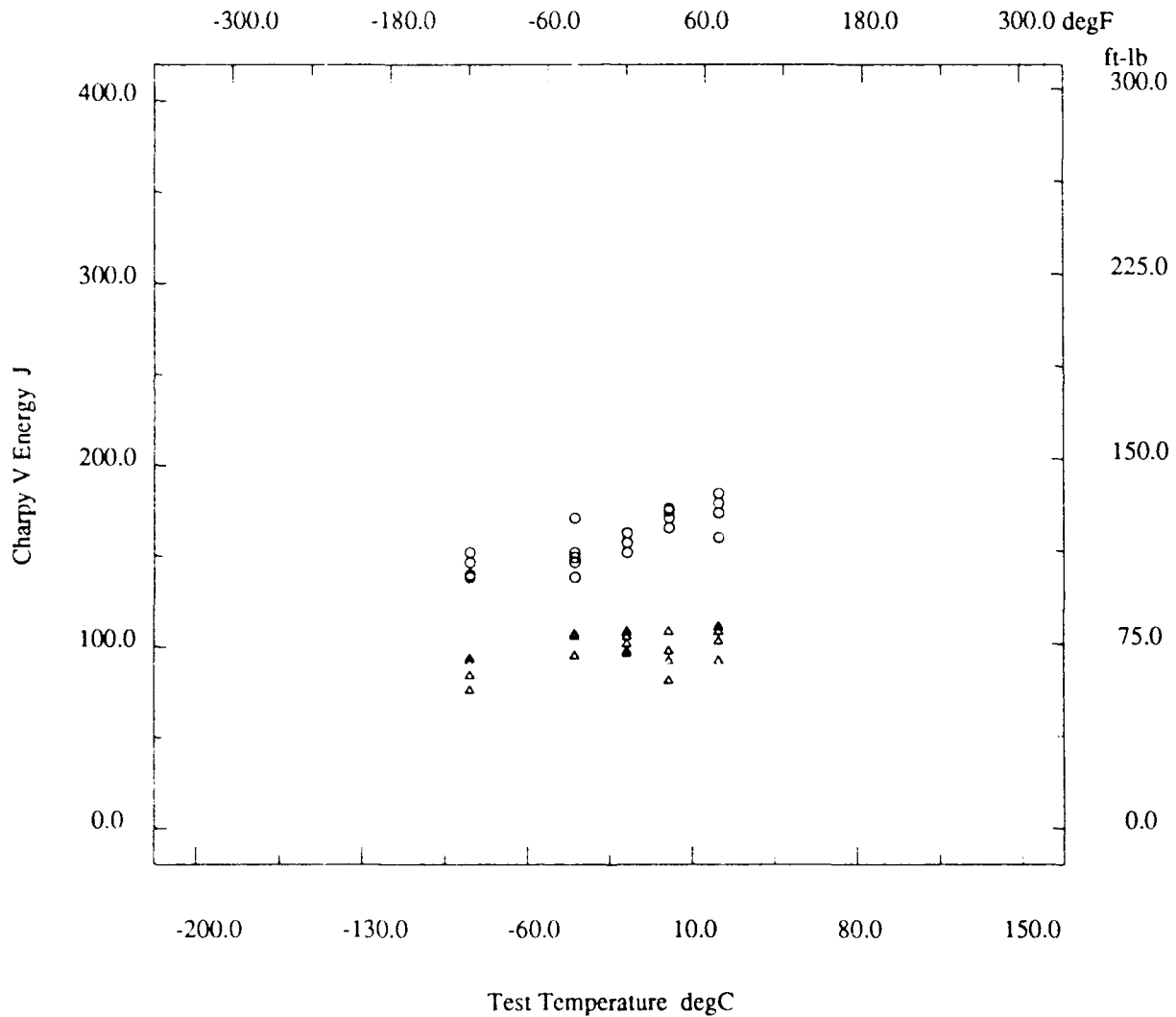


# Marine Structural Toughness Data Bank

Material HY80

Page 16900.4

Description			
Material Code	001.005.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3631-7L
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16900.5

<b>Description</b>						
Material Code	001.005.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3631-7L			
Reference	USN-1					
<b>Composition</b>		See Page 16900.1				
<b>Fabrication History</b>						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Bottom	Killing Process	*			
Process Temperature	1600 degF	Process Time	1.95 hr			
Rolling Conditions	74 %	Final Processing	A,Q,T			
Final Temperature	1280 degF	Final Time	1.05 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Suength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	91.7	105.5	*	22	62.4

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 16900.6

<b>Description</b>	
Material Code . . . . .	001.005.01B2
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	1 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	D3631-7L
<b>Composition</b>	
See Page 16900.1	
<b>Fabrication History</b>	
See Page 16900.5	
<b>Property Measurements</b>	
Test Type . . . . .	Charpy V Impact
Specimen Type . . . . .	Full
Shear Fracture . . . . .	*
Did Specimen Split? . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Lateral Expansion . . . . .	*
Did Specimen Fracture? . . . . .	Assumed
Standard Method . . . . .	*

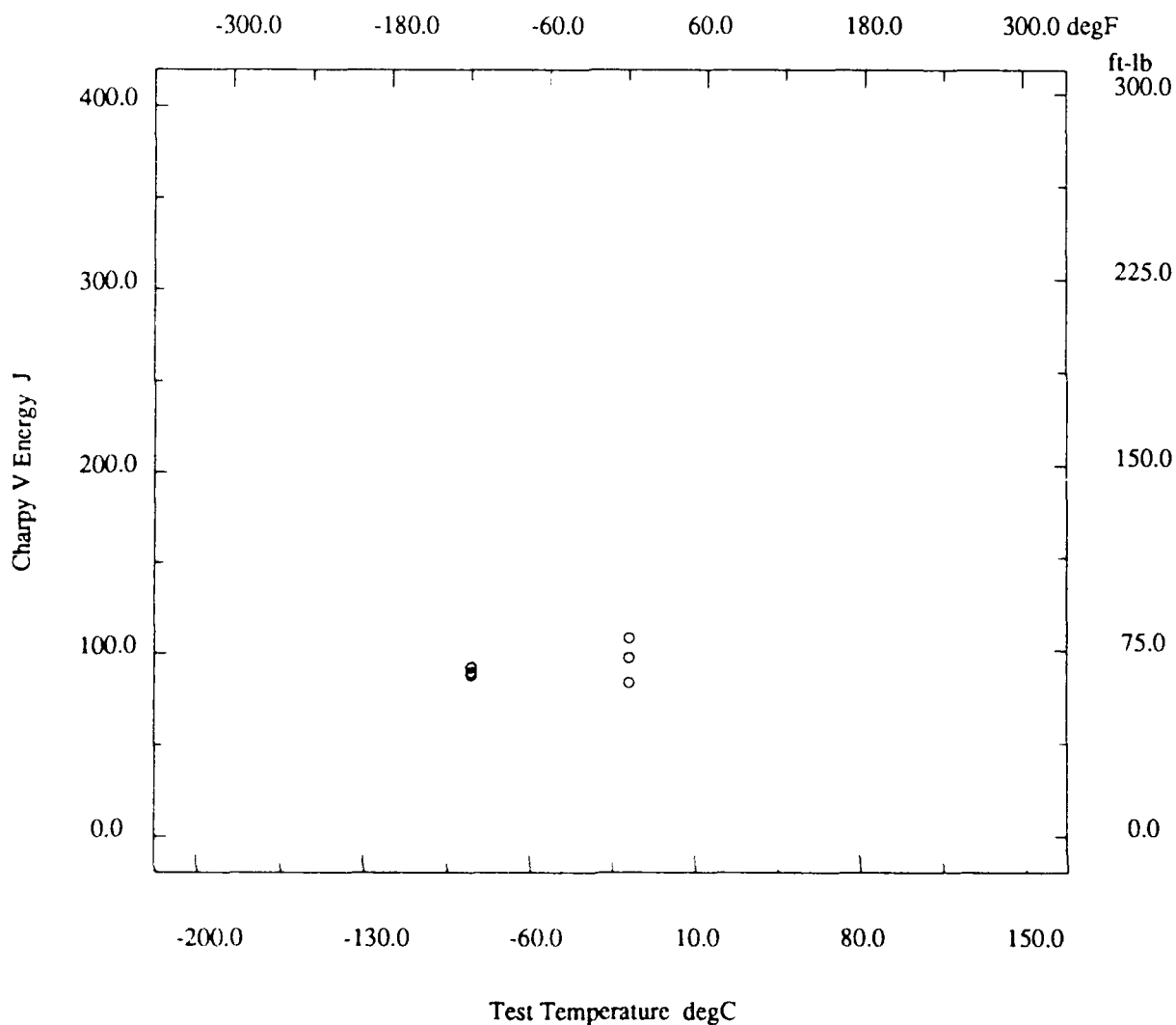
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	65
T-L °	-120	66
T-L °	-120	68
T-L °	0	62
T-L °	0	72
T-L °	0	80

# Marine Structural Toughness Data Bank

Material HY80

Page 16900.7

Description			
Material Code	001.005.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3631-7L
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.1

Description						
Material Code	001.006.01T1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	0.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3667-3M			
Reference	USN-1					
Composition						
C	0.16 %	Mn	0.25 %			
P	0.011 %	S	0.015 %			
Si	0.25 %	Cr	1.48 %			
Ni	2.80 %	Mo	0.40 %			
V	0.004 %	Cu	0.13 %			
Cb	*	Ti	0.003 %			
B	*	Al	0.023 %			
N	*	Other Components	As=0.007;Sn=0.012;Sb=0.008 %			
Fabrication History						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Top	Killing Process	*			
Process Temperature	1660 degF	Process Time	0.58 hr			
Rolling Conditions	92 %	Final Processing	A,Q,T			
Final Temperature	1300 degF	Final Time	0.58 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
Property Measurements						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	107.0	92.6	*	22	58.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.2

<b>Description</b>		
Material Code	001.006.01T1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	0.75 in	Composition Type Actual
Composition Position	Ladle	Lot ID D3667-3M
Reference	USN-1	
<b>Composition</b>		See Page 17000.1
<b>Fabrication History</b>		See Page 17000.1
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	108
L-T °	-120	110
L-T °	-120	116
L-T °	-120	118
L-T °	-120	120
L-T °	-40	120
L-T °	-40	122
L-T °	-40	128
L-T °	-40	128
L-T °	-40	138
L-T °	0	122
L-T °	0	122
L-T °	0	124
L-T °	0	125
L-T °	0	132
L-T °	32	118
L-T °	32	126
L-T °	32	128
L-T °	32	130
L-T °	32	133
L-T °	70	122
L-T °	70	127
L-T °	70	128
L-T °	70	132
L-T °	70	136
T-L ^	-120	53
T-L ^	-120	54
T-L ^	-120	57
T-L ^	-120	57
T-L ^	-120	60
T-L ^	-40	63
T-L ^	-40	64
T-L ^	-40	68

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	70
T-L Δ	-40	71
T-L Δ	0	58
T-L Δ	0	62
T-L Δ	0	63
T-L Δ	0	63
T-L Δ	0	71
T-L Δ	32	64
T-L Δ	32	69
T-L Δ	32	70
T-L Δ	32	71
T-L Δ	32	74
T-L Δ	70	62
T-L Δ	70	66
T-L Δ	70	69
T-L Δ	70	70
T-L Δ	70	75

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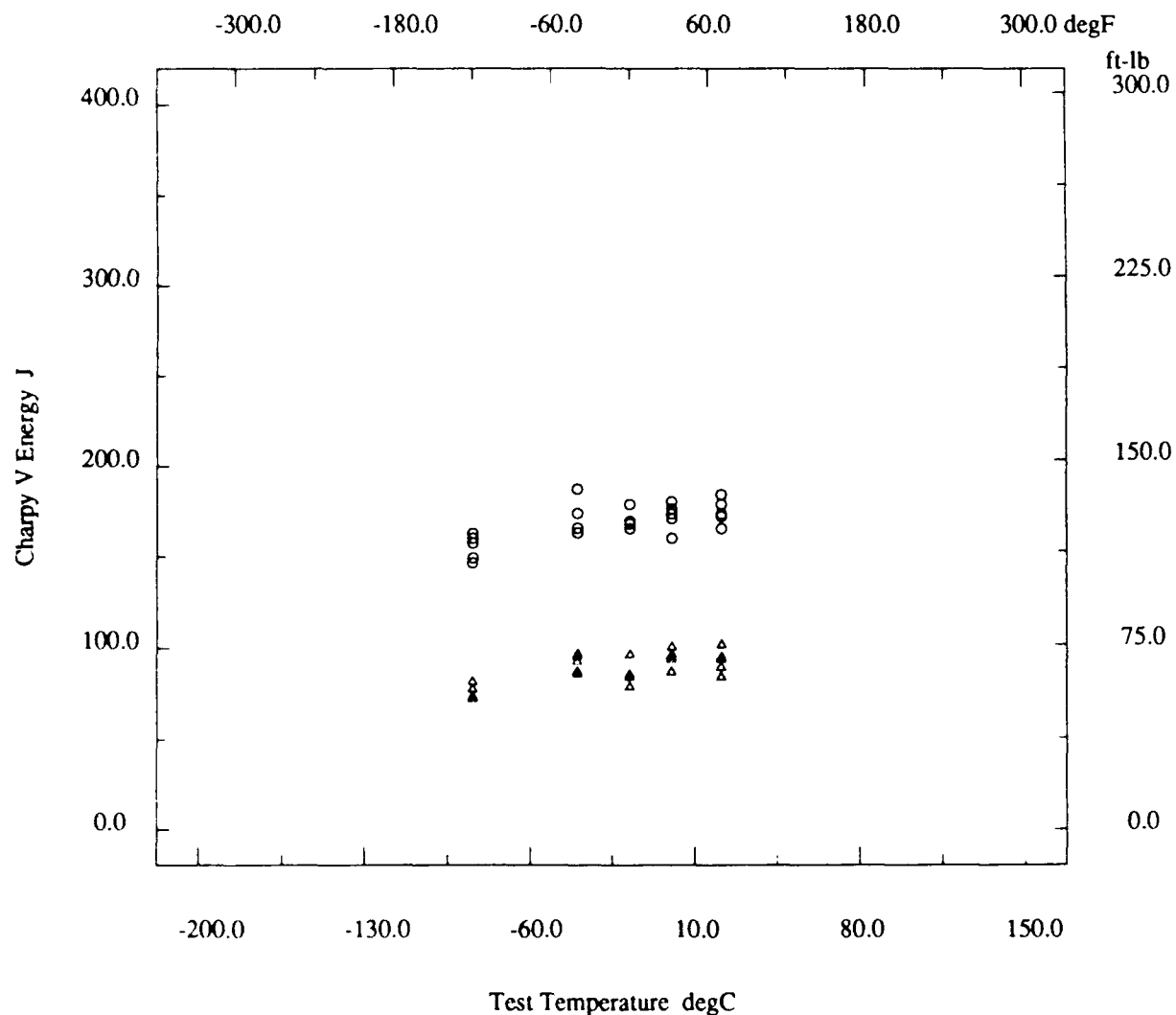
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.4

Description			
Material Code	001.006.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17000.5

<b>Description</b>			
Material Code	001.006.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		
<b>Composition</b>		See Page 17000.1	
<b>Fabrication History</b>		See Page 17000.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	710	*

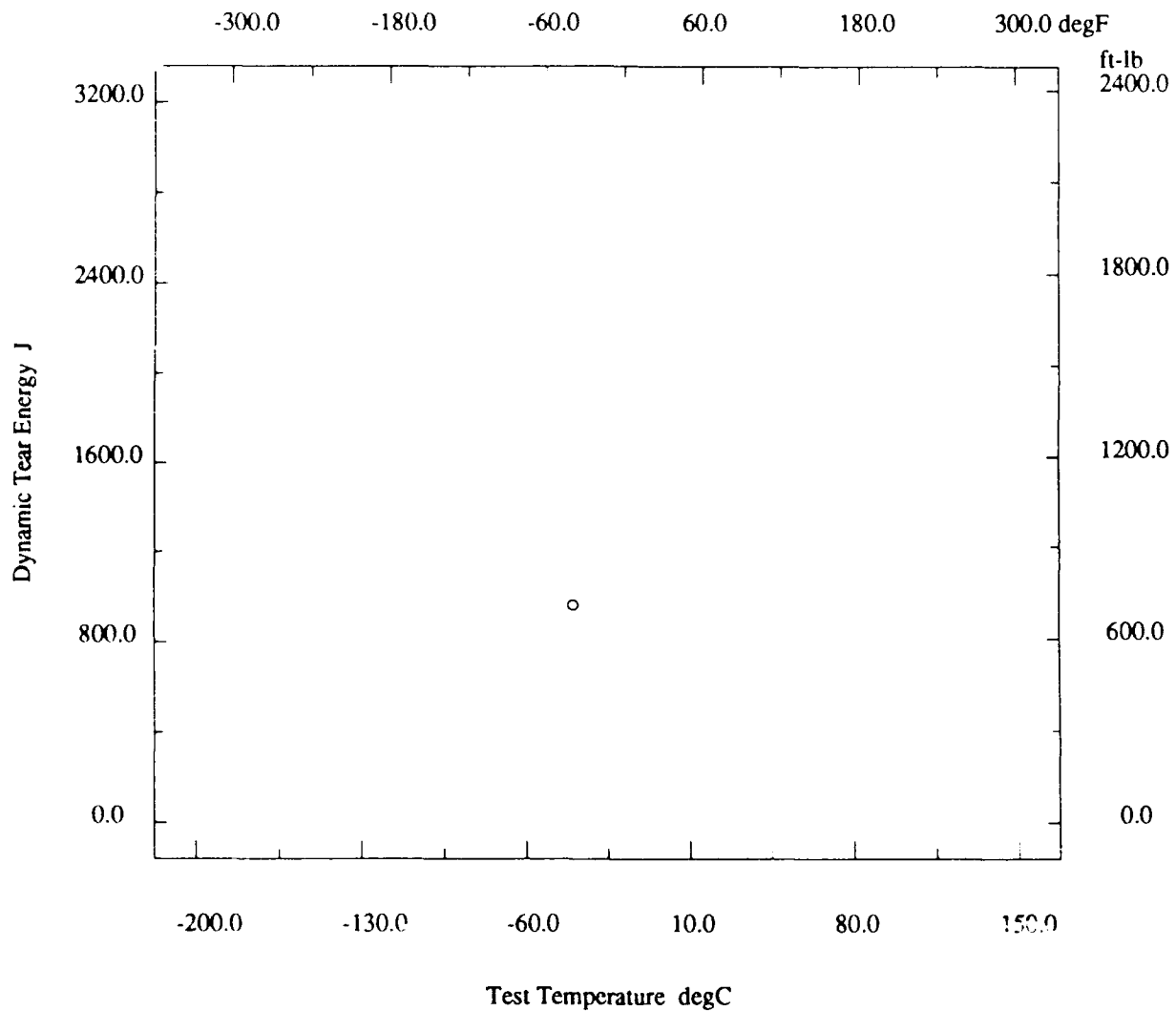
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.6

Description			
Material Code	001.006.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.7

<b>Description</b>			
Material Code	001.006.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		

**Composition** See Page 17000.1

<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Bottom	Killing Process	*
Process Temperature	1660 degF	Process Time	0.58 hr
Rolling Conditions	92 %	Final Processing	A,Q,T
Final Temperature	1300 degF	Final Time	0.58 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	104.9	92.2	*	20	60.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.8

<b>Description</b>			
Material Code	001.006.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		

<b>Composition</b>	See Page 17000.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17000.7
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	43
T-L ◊	-120	47
T-L ◊	-120	49
T-L ◊	0	56
T-L ◊	0	60
T-L ◊	0	65

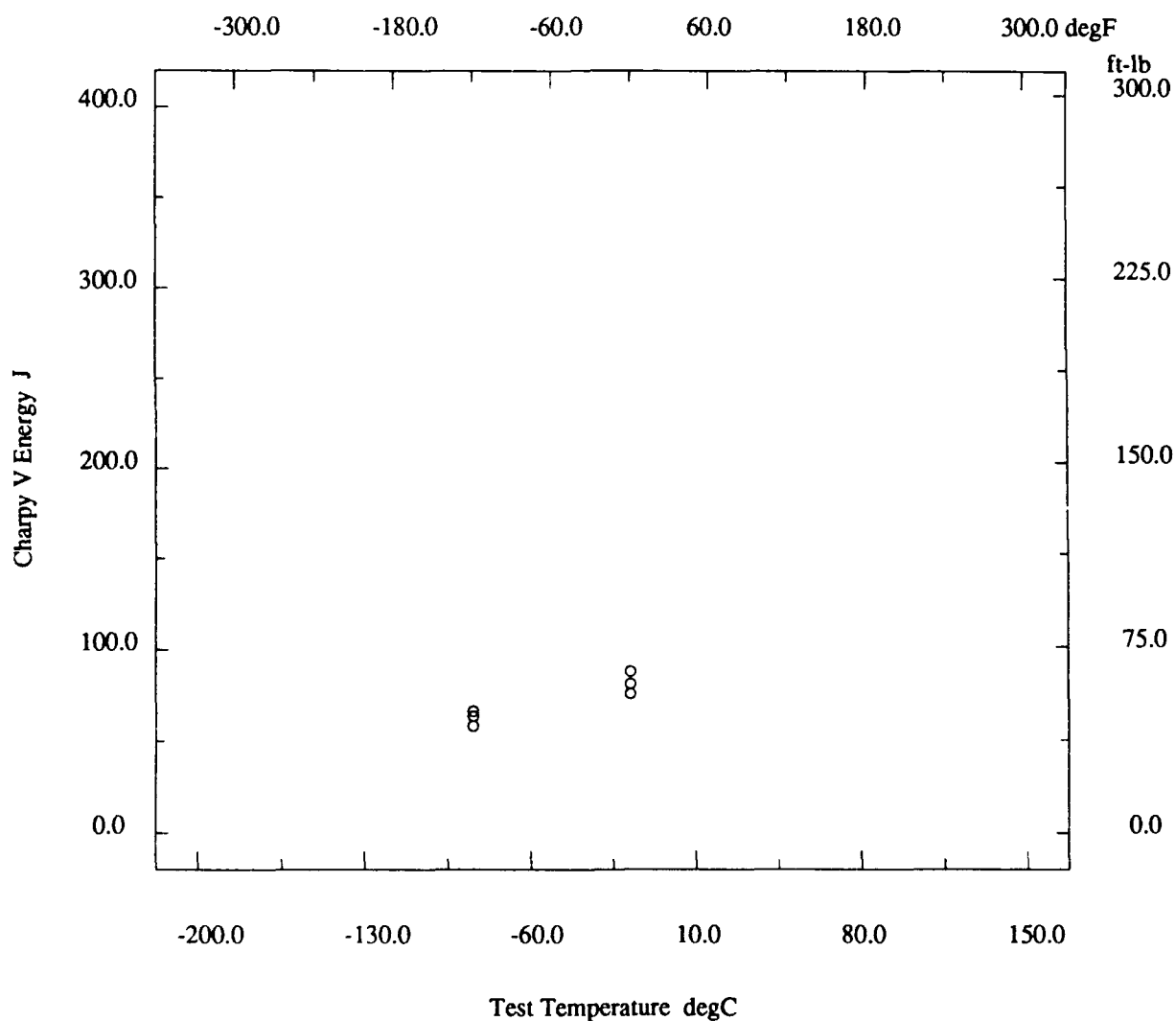
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.9

Description			
Material Code	001.006.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.10

<b>Description</b>			
Material Code	001.006.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		

<b>Composition</b>	See Page 17000.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17000.7
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

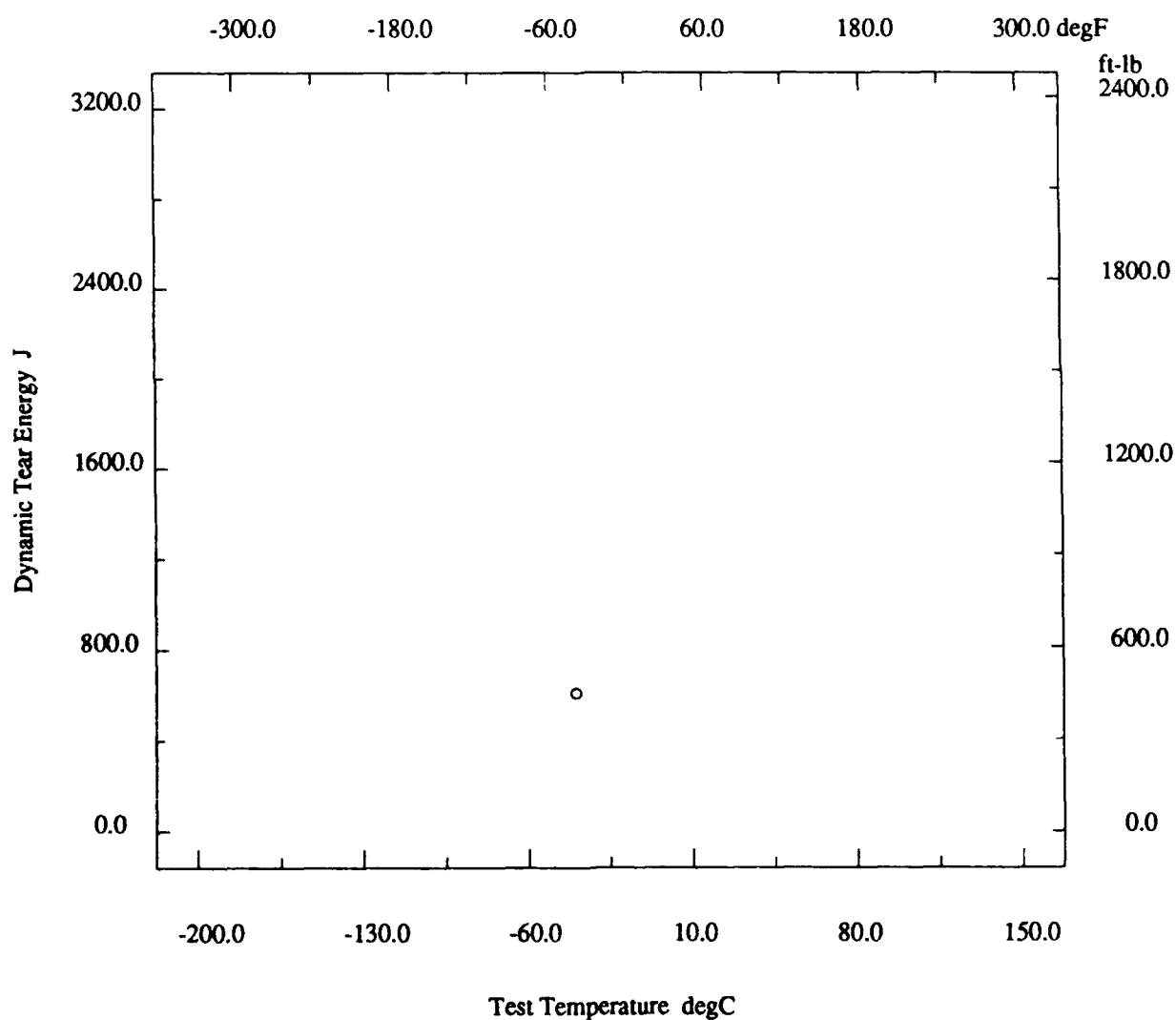
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	450	*

# Marine Structural Toughness Data Bank

Material HY80

Page 17000.11

Description			
Material Code	001.006.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3667-3M
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.1

<b>Description</b>							
Material Code	001.007.01T1	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	6.5 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	B8601-5				
Reference	USN-1						
<b>Composition</b>							
C	0.16 %	Mn	0.28 %				
P	0.01 %	S	0.007 %				
Si	0.27 %	Cr	1.47 %				
Ni	2.79 %	Mo	0.41 %				
V	0.01 %	Cu	0.13 %				
Cb	*	Ti	0.003 %				
B	*	Al	0.029 %				
N	*	Other Components	As=0.010;Sn=0.010;Sb=0.007 %				
<b>Fabrication History</b>							
Heat Treatment	A,Q,T	Producer	*				
Year Produced	1982	Addl Info	No				
Source	*	Melting Practice	*				
Ingot Position	Top	Killing Process	*				
Process Temperature	1650 degF	Process Time	6.5 hr				
Rolling Conditions	81 %	Final Processing	A,Q,T				
Final Temperature	1180 degF	Final Time	6.5 hr				
Cold Work Strain	*	Aging Temperature	*				
Aging Time	*	Location	*				
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	111.4	96.5	*	21	69.2	

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17100.2

<b>Description</b>			
Material Code	001.007.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		
<b>Composition</b>		See Page 17100.1	
<b>Fabrication History</b>		See Page 17100.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	47
L-T °	-120	49
L-T °	-120	54
L-T °	-120	63
L-T °	-120	66
L-T °	-40	101
L-T °	-40	75
L-T °	-40	77
L-T °	-40	83
L-T °	-40	99
L-T °	0	107
L-T °	0	114
L-T °	0	122
L-T °	0	90
L-T °	0	95
L-T °	32	116
L-T °	32	124
L-T °	32	124
L-T °	32	130
L-T °	32	132
L-T °	70	119
L-T °	70	120
L-T °	70	131
L-T °	70	139
L-T °	70	142
T-L ▲	-120	26
T-L ▲	-120	38
T-L ▲	-120	42
T-L ▲	-120	46
T-L ▲	-120	48
T-L ▲	-40	54
T-L ▲	-40	54
T-L ▲	-40	70

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	70
T-L Δ	-40	78
T-L Δ	0	72
T-L Δ	0	88
T-L Δ	0	90
T-L Δ	0	92
T-L Δ	0	99
T-L Δ	32	100
T-L Δ	32	88
T-L Δ	32	94
T-L Δ	32	95
T-L Δ	32	99
T-L Δ	70	108
T-L Δ	70	112
T-L Δ	70	112
T-L Δ	70	94
T-L Δ	70	96

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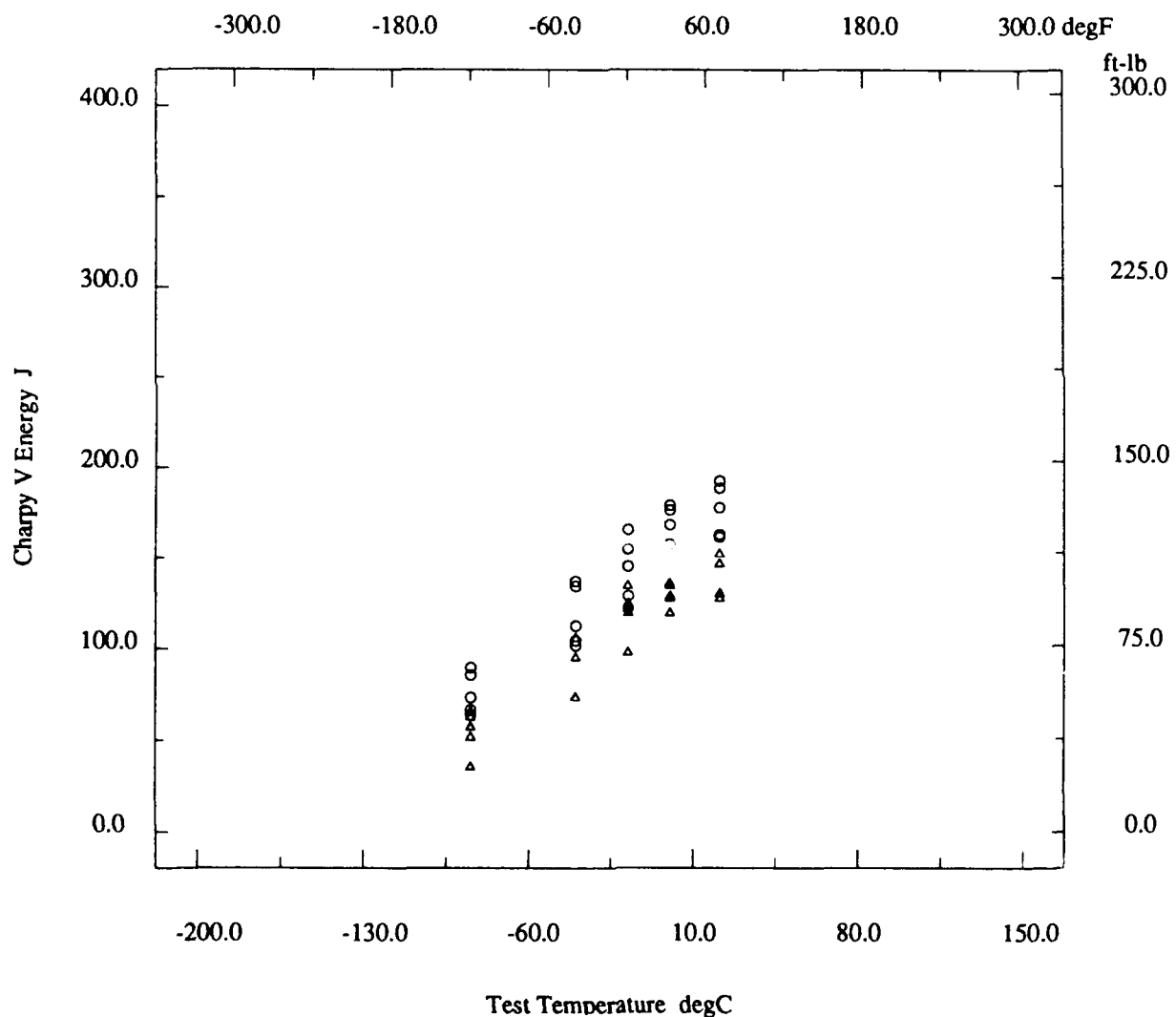
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.4

Description			
Material Code	001.007.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.5

<b>Description</b>	
Material Code	001.007.01TM
UNS	*
Type	Wrought Metal
Thickness	6.5 in
Composition Position	Ladle
Reference	USN-1
<b>Composition</b>	
See Page 17100.1	
<b>Fabrication History</b>	
See Page 17100.1	
<b>Property Measurements</b>	
Test Type	Tensile
Specimen Type	*
Gage Length	*
Tensile Strength Offset	*
Tensile Modulus	*
Standard Year	*
Position	1/4T
Specimen Thickness	*
Loading Rate	*
Uniform Elongation	*
Standard Method	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	111.3	97.6	*	24	71.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.6

<b>Description</b>		
Material Code	001.007.01TM	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	6.5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8601-5

<b>Composition</b>	See Page 17100.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17100.1
----------------------------	------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	38
T-L ◊	-120	38
T-L ◊	-120	50
T-L ◊	0	68
T-L ◊	0	74
T-L ◊	0	80

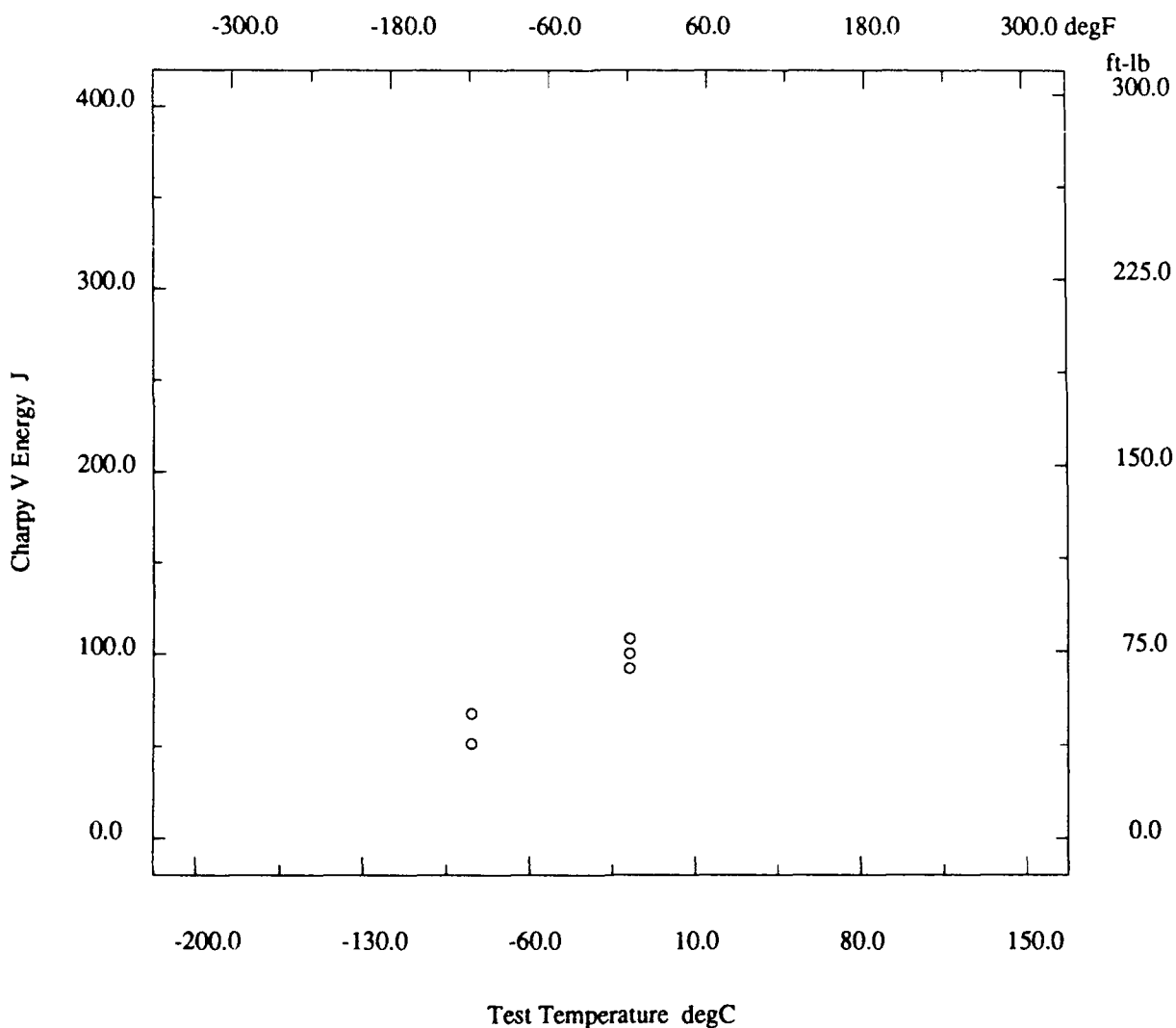
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.7

Description			
Material Code	001.007.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.8

<b>Description</b>						
Material Code	001.007.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	6.5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8601-5			
Reference	USN-1					
<b>Composition</b>		See Page 17100.1				
<b>Fabrication History</b>		See Page 17100.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	110.8	95.3	*	22	68.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.9

<b>Description</b>		
Material Code	001.007.01T2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	6.5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8601-5

**Composition** See Page 17100.1

**Fabrication History** See Page 17100.1

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-120	36
T-L ◯	-120	38
T-L ◯	-120	50
T-L ◯	0	64
T-L ◯	0	66
T-L ◯	0	84

\* - not reported

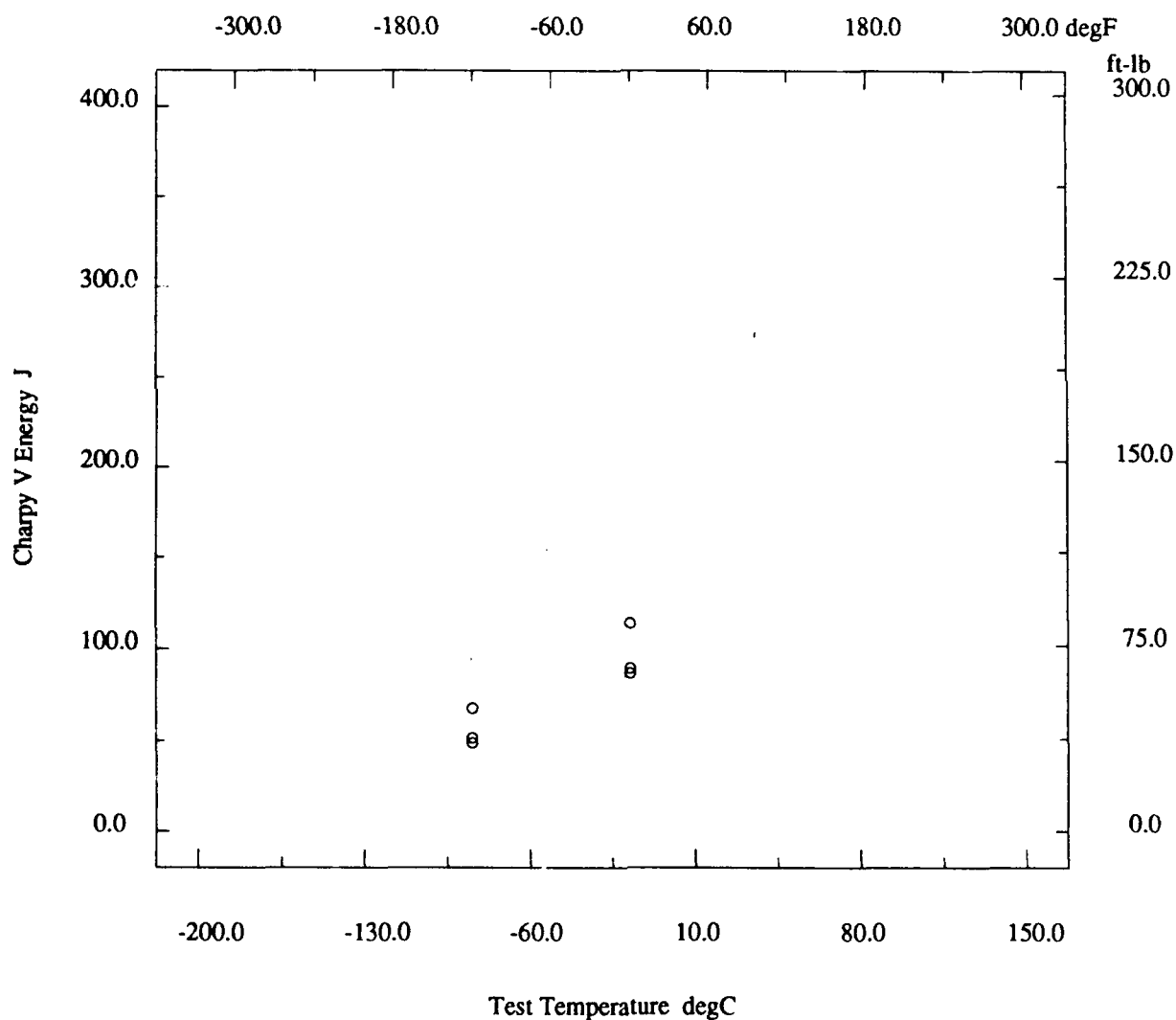


# Marine Structural Toughness Data Bank

Material HY80

Page 17100.10

Description			
Material Code	001.007.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.11

<b>Description</b>	
Material Code . . . . .	001.007.01B1
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	6.5 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	B8601-5
<b>Composition</b>	
See Page 17100.1	
<b>Fabrication History</b>	
Heat Treatment . . . . .	A,Q,T
Year Produced . . . . .	1982
Source . . . . .	*
Ingot Position . . . . .	Bottom
Process Temperature . . . . .	1650 degF
Rolling Conditions . . . . .	81 %
Final Temperature . . . . .	1180 degF
Cold Work Strain . . . . .	*
Aging Time . . . . .	*
Producer . . . . .	*
Addl Info . . . . .	No
Melting Practice . . . . .	*
Killing Process . . . . .	*
Process Time . . . . .	6.5 hr
Final Processing . . . . .	A,Q,T
Final Time . . . . .	6.5 hr
Aging Temperature . . . . .	*
Location . . . . .	*
<b>Property Measurements</b>	
Test Type . . . . .	Tensile
Specimen Type . . . . .	*
Gage Length . . . . .	*
Tensile Strength Offset . . . . .	*
Tensile Modulus . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Specimen Thickness . . . . .	*
Loading Rate . . . . .	*
Uniform Elongation . . . . .	*
Standard Method . . . . .	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.5	86.7	*	21	64.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.12

<b>Description</b>		
Material Code	001.007.01B1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	6.5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8601-5

<b>Composition</b>	See Page 17100.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17100.11
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	24
T-L ◦	-120	42
T-L ◦	-120	44
T-L ◦	0	64
T-L ◦	0	74
T-L ◦	0	76

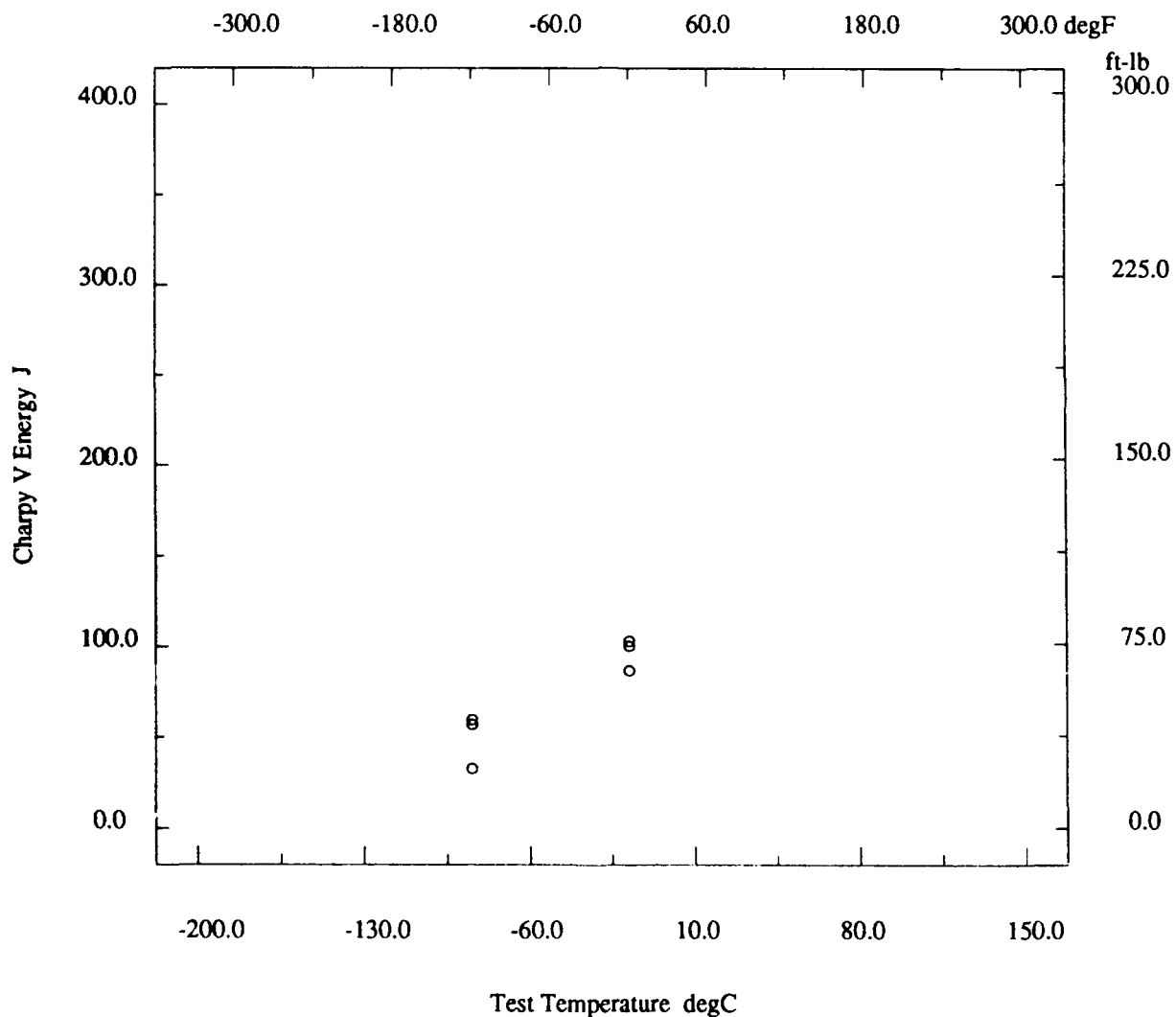
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.13

Description			
Material Code	001.007.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.14

<b>Description</b>						
Material Code	001.007.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	6.5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8601-5			
Reference	USN-1					
<b>Composition</b>		See Page 17100.1				
<b>Fabrication History</b>		See Page 17100.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp, degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	103.0	84.2	*	22	67.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.15

<b>Description</b>			
Material Code	001.007.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		
<b>Composition</b>		See Page 17100.1	
<b>Fabrication History</b>		See Page 17100.11	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	22
T-L °	-120	28
T-L °	-120	32
T-L °	0	74
T-L °	0	76
T-L °	0	76

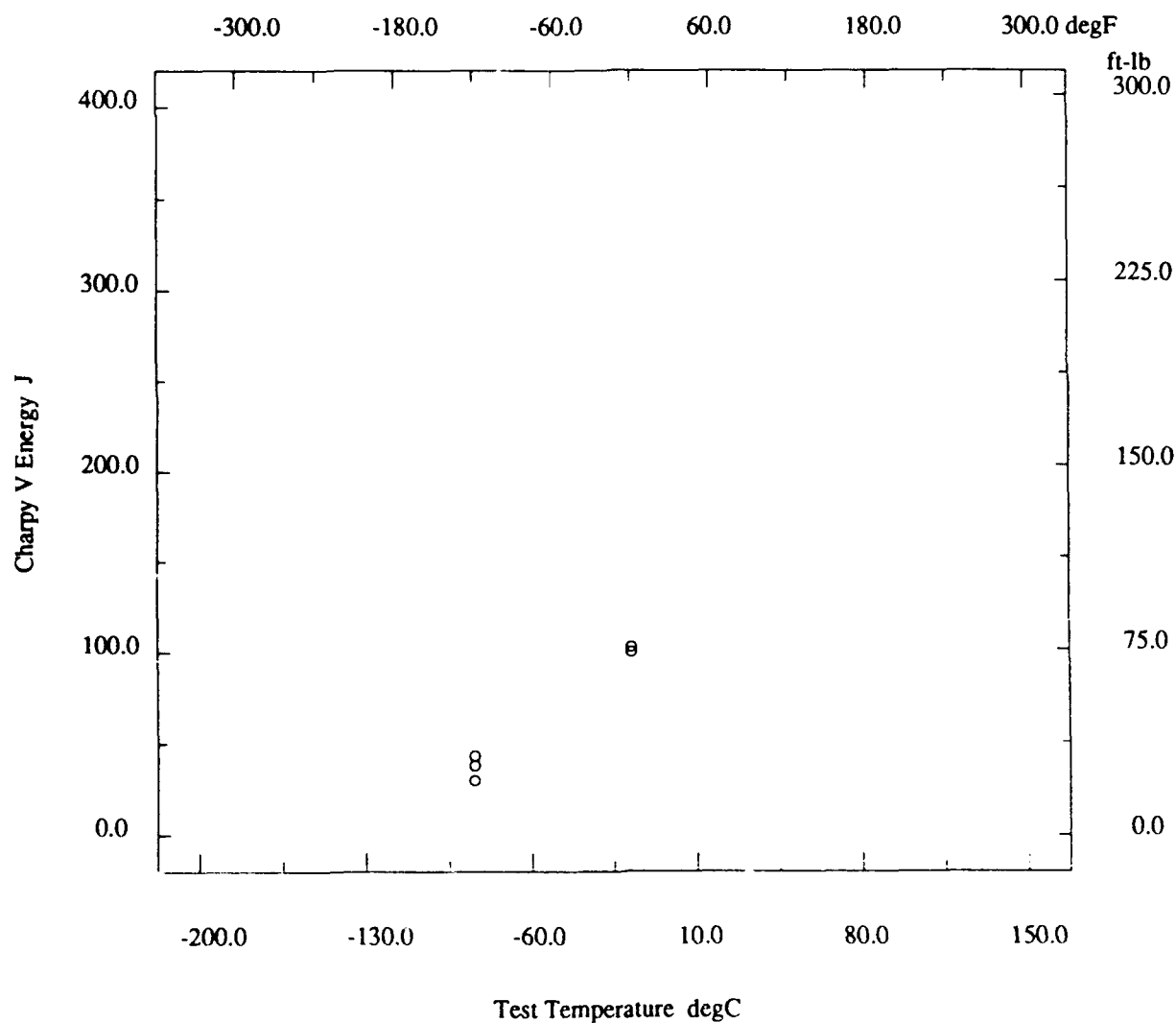
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.16

Description			
Material Code	001.007.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.17

<b>Description</b>						
Material Code	001.007.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	6.5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8601-5			
Reference	USN-1					
<b>Composition</b>		See Page 17100.1				
<b>Fabrication History</b>		See Page 17100.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	110.8	95.9	*	23	70.8

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17100.18

<b>Description</b>			
Material Code	001.007.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		
<b>Composition</b>		See Page 17100.1	
<b>Fabrication History</b>		See Page 17100.11	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

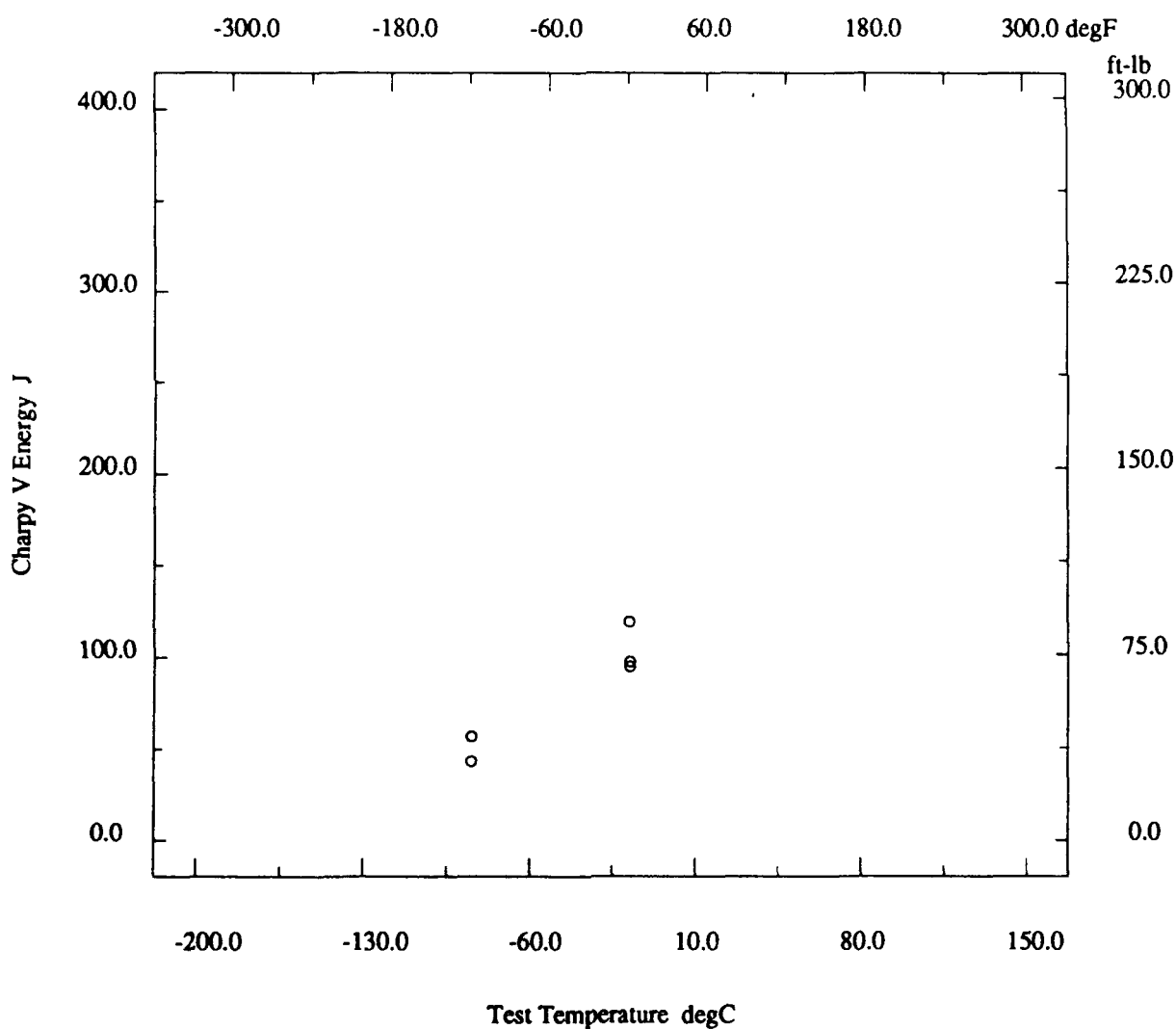
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	32
T-L ◦	-120	32
T-L ◦	-120	42
T-L ◦	0	70
T-L ◦	0	72
T-L ◦	0	88

# Marine Structural Toughness Data Bank

Material HY80

Page 17100.19

Description			
Material Code	001.007.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	6.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8601-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.1

<b>Description</b>			
Material Code	001.008.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>			
C	0.16 %	Mn	0.27 %
P	0.007 %	S	0.007 %
Si	0.24 %	Cr	1.48 %
Ni	2.83 %	Mo	0.40 %
V	0.01 %	Cu	0.11 %
Cb	*	Ti	0.003 %
B	*	Al	0.039 %
N	*	Other Components	As=0.008;Sn=0.009;Sb=0.003 %
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Top	Killing Process	*
Process Temperature	1650 degF	Process Time	6.03 hr
Rolling Conditions	85 %	Final Processing	A,Q,T
Final Temperature	1200 degF	Final Time	5 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	100.0	85.3	*	23	70.9

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.2

<b>Description</b>		
Material Code	001.008.01T1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	5 in	Composition Type Actual
Composition Position	Ladle	Lot ID B8740-2
Reference	USN-1	
<b>Composition</b>		See Page 17200.1
<b>Fabrication History</b>		See Page 17200.1
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	110
L-T °	-120	116
L-T °	-120	116
L-T °	-120	92
L-T °	-120	93
L-T °	-40	140
L-T °	-40	144
L-T °	-40	156
L-T °	-40	158
L-T °	-40	160
L-T °	0	147
L-T °	0	155
L-T °	0	156
L-T °	0	160
L-T °	0	170
L-T °	32	153
L-T °	32	159
L-T °	32	162
L-T °	32	164
L-T °	32	166
L-T °	70	146
L-T °	70	150
L-T °	70	156
L-T °	70	158
L-T °	70	162
T-L ▲	-120	86
T-L ▲	-120	86
T-L ▲	-120	91
T-L ▲	-120	95
T-L ▲	-120	96
T-L ▲	-40	118
T-L ▲	-40	120
T-L ▲	-40	121

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	126
T-L Δ	-40	127
T-L Δ	0	126
T-L Δ	0	126
T-L Δ	0	128
T-L Δ	0	132
T-L Δ	0	136
T-L Δ	32	131
T-L Δ	32	132
T-L Δ	32	133
T-L Δ	32	138
T-L Δ	32	138
T-L Δ	70	132
T-L Δ	70	132
T-L Δ	70	134
T-L Δ	70	138
T-L Δ	70	140

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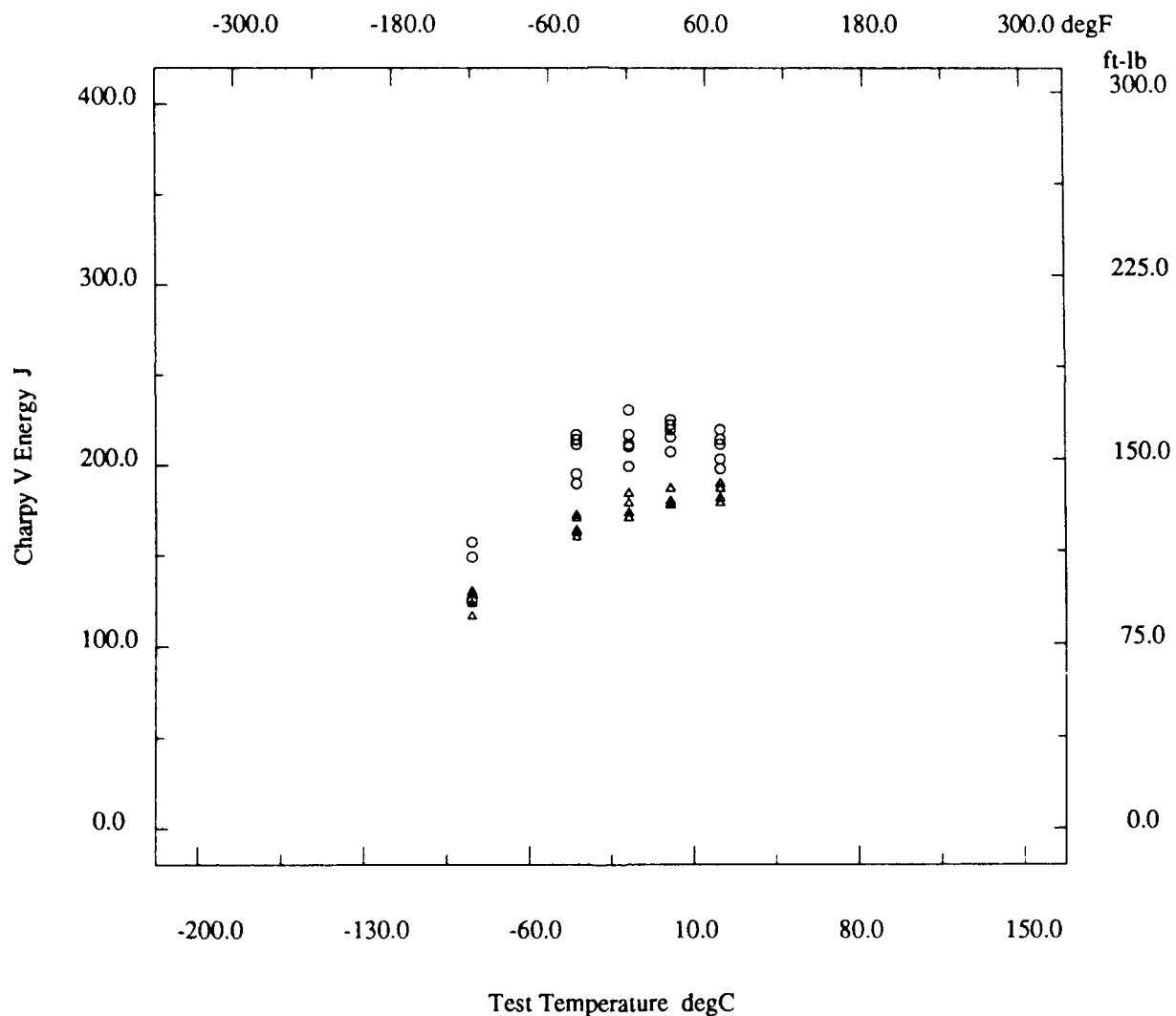
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.4

Description			
Material Code	001.008.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.5

<b>Description</b>			
Material Code	001.008.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

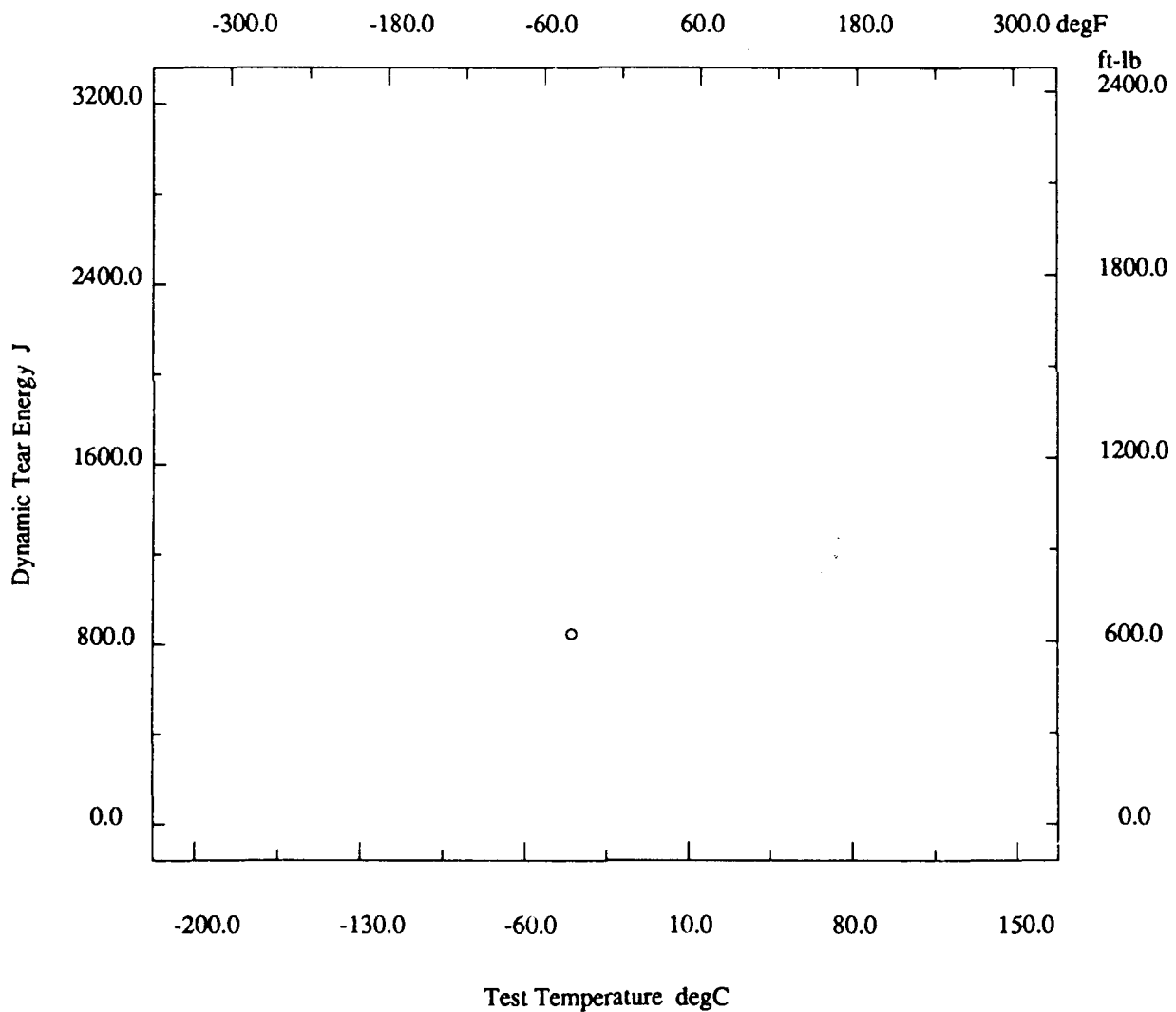
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L ◯	-40	625	*

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.6

Description			
Material Code	001.008.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17200.7

Description						
Material Code	001.008.01TM					
UNS	*					
Type	Wrought Metal					
Thickness	5 in					
Composition Position	Ladle					
Reference	USN-1					
Material Name		HY80				
Other Designation		*				
Form		Plate				
Composition Type		Actual				
Lot ID		B8740-2				
Composition		See Page 17200.1				
Fabrication History		See Page 17200.1				
Property Measurements						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	99.0	80.1	*	25	71.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.8

<b>Description</b>			
Material Code	001.008.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	104
T-L ◊	-120	92
T-L ◊	-120	94
T-L ◊	0	118
T-L ◊	0	123
T-L ◊	0	142

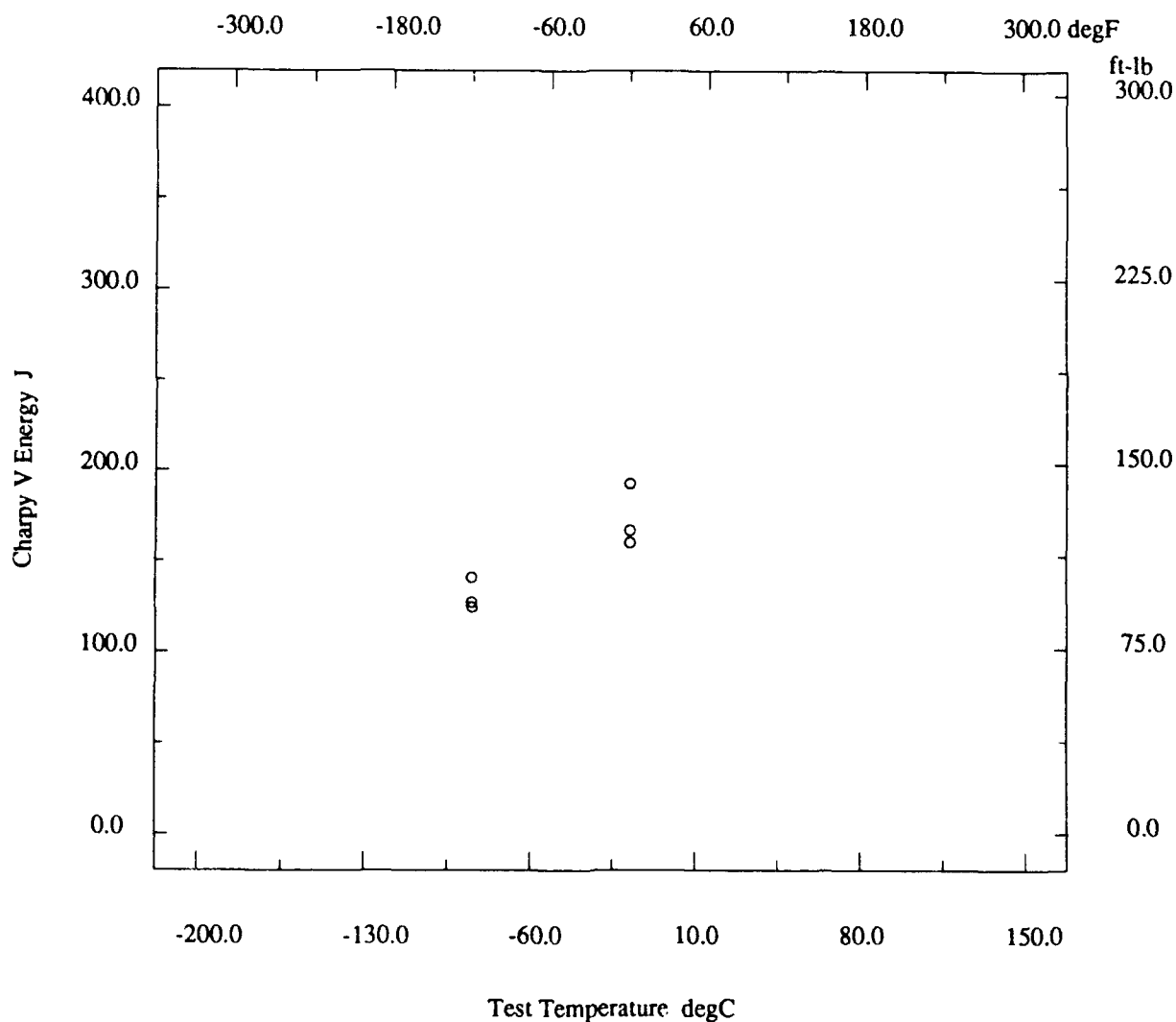
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.9

Description			
Material Code	001.008.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.10

<b>Description</b>			
Material Code	001.008.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

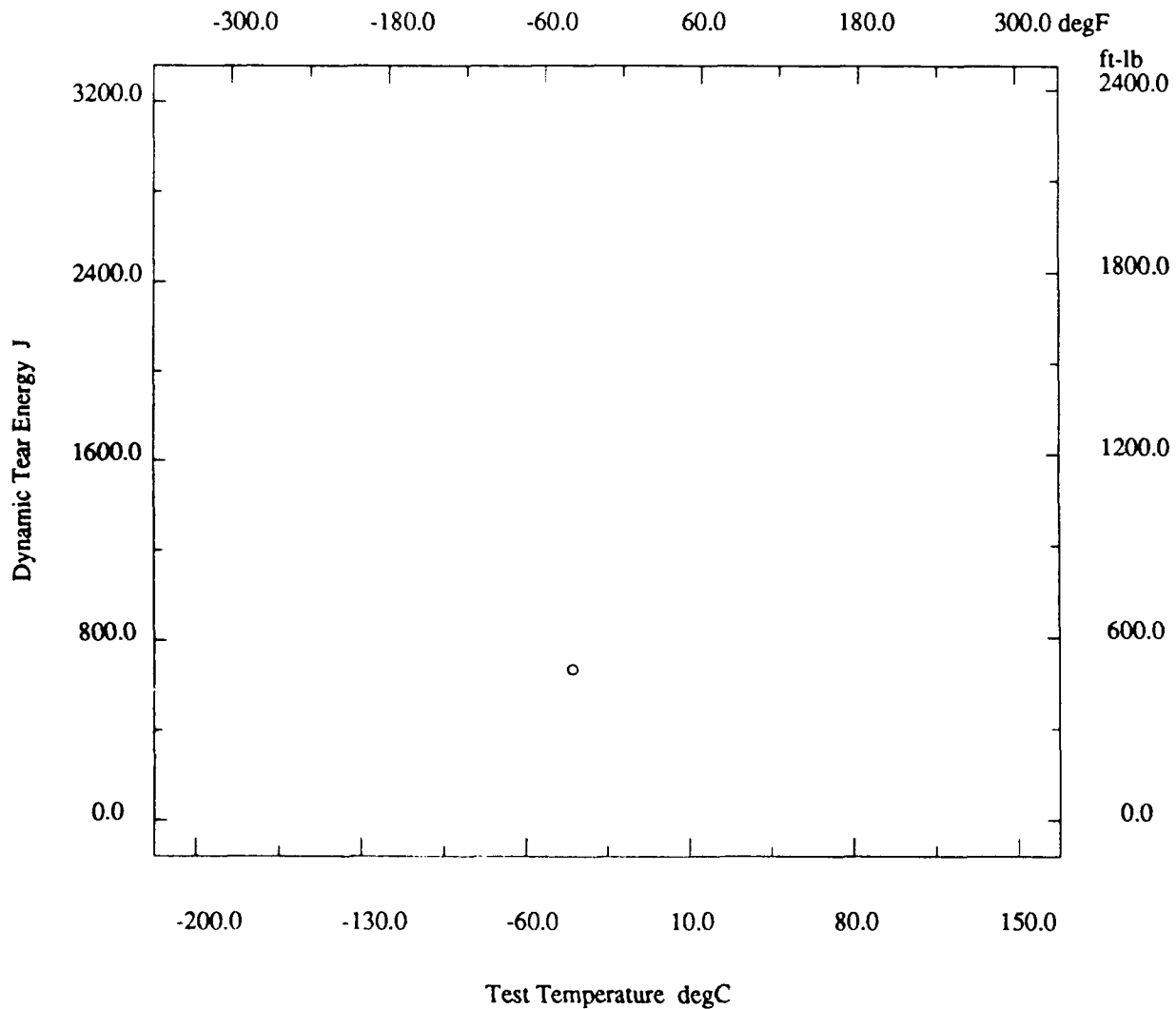
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	495	*

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.11

Description			
Material Code	001.008.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.12

Description	
Material Code	001.008.01T2
UNS	*
Type	Wrought Metal
Thickness	5 in
Composition Position	Ladle
Reference	USN-1
Composition	
See Page 17200.1	
Fabrication History	
See Page 17200.1	
Property Measurements	
Test Type	Tensile
Specimen Type	*
Gage Length	*
Tensile Strength Offset	*
Tensile Modulus	*
Standard Year	*
Position	1/4T
Specimen Thickness	*
Loading Rate	*
Uniform Elongation	*
Standard Method	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	99.0	80.2	*	25	72.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.13

<b>Description</b>			
Material Code	001.008.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

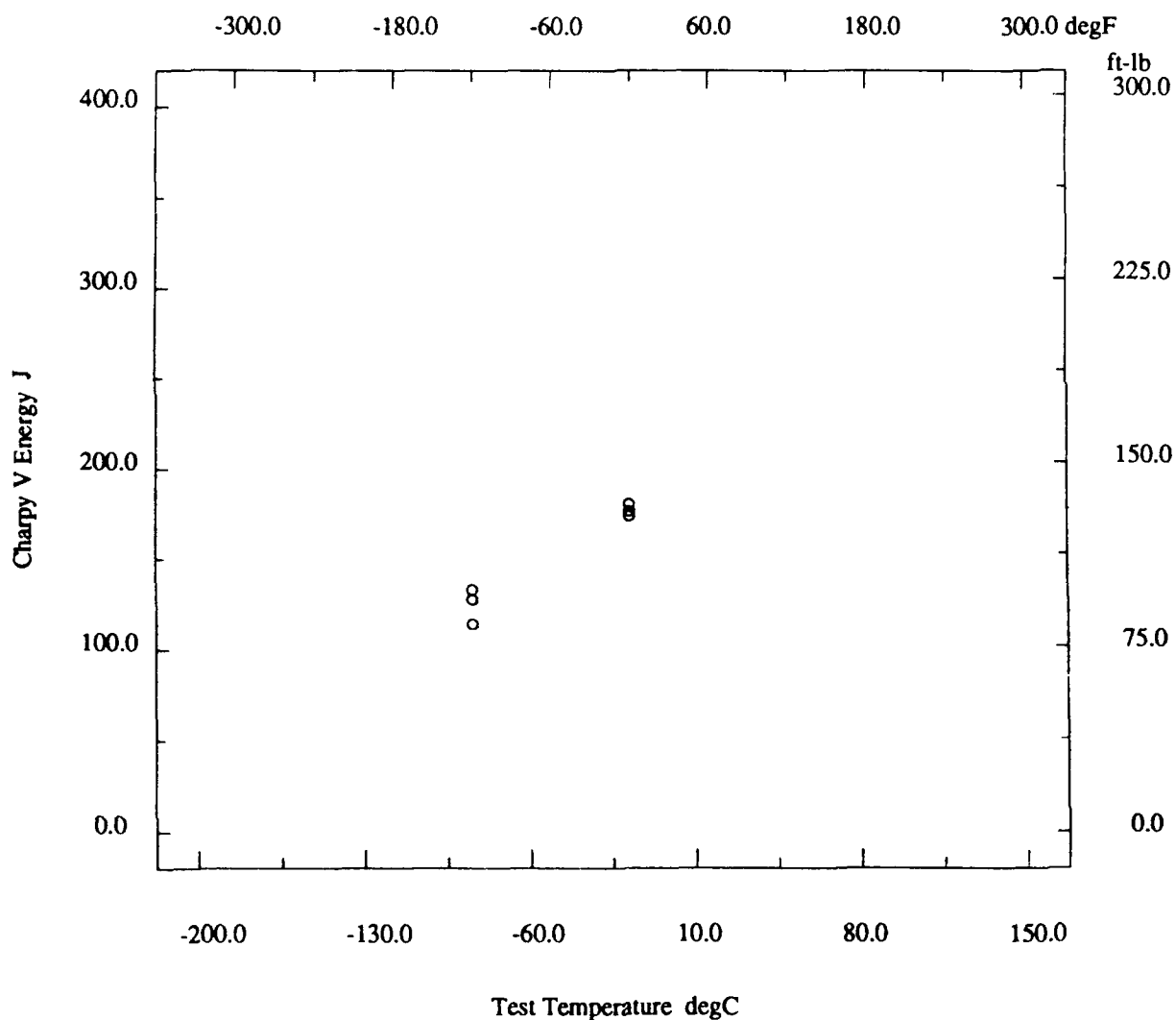
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	84
T-L ◦	-120	94
T-L ◦	-120	98
T-L ◦	0	128
T-L ◦	0	130
T-L ◦	0	133

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.14

Description			
Material Code	001.008.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17200.15

<b>Description</b>			
Material Code	001.008.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		

<b>Composition</b>	See Page 17200.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17200.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	500	*

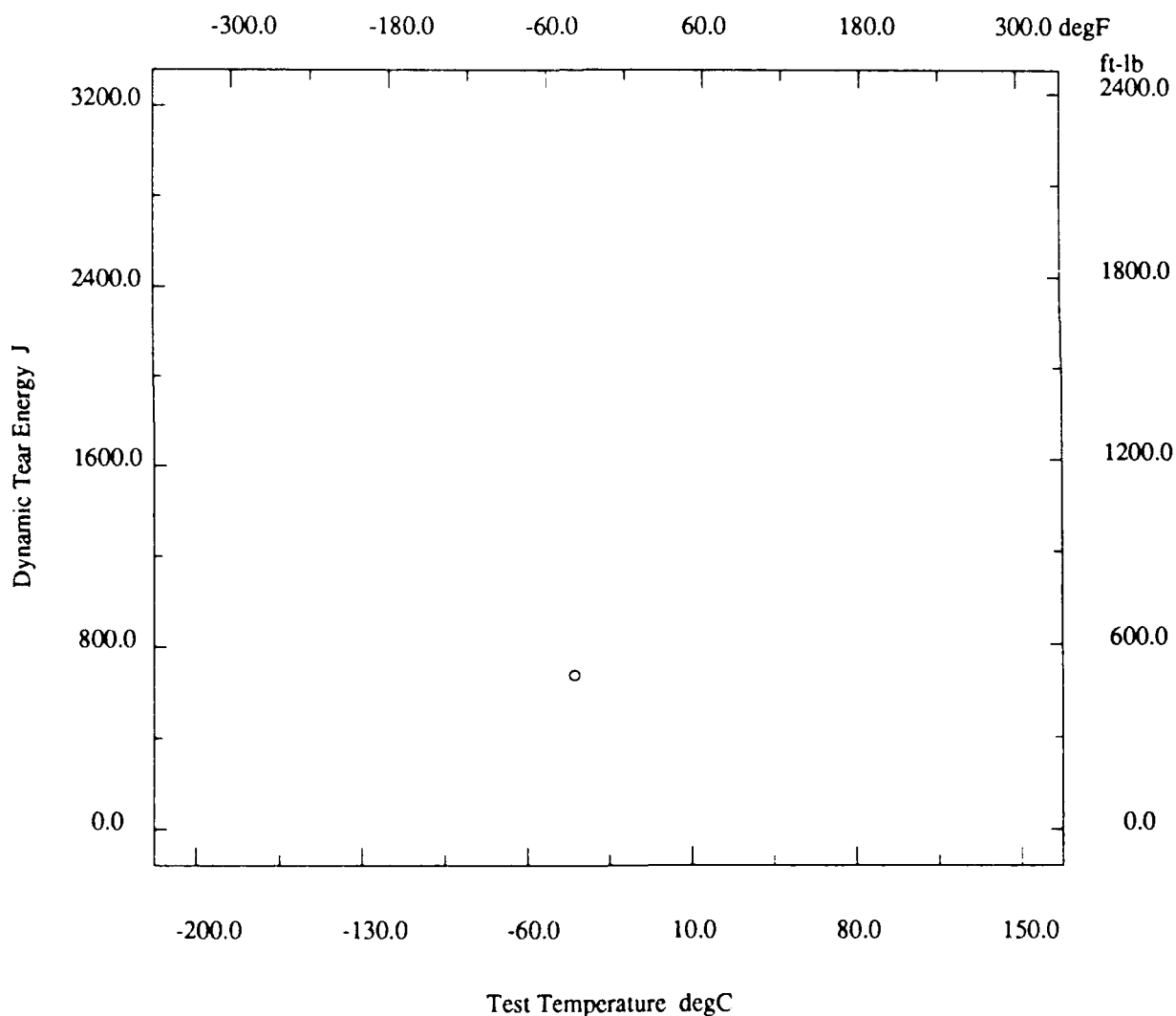
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.16

Description			
Material Code	001.008.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.17

<b>Description</b>	
Material Code . . . . .	001.008.01M1
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	5 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	B8740-2
<b>Composition</b>	
See Page 17200.1	
<b>Fabrication History</b>	
Heat Treatment . . . . .	A,Q,T
Year Produced . . . . .	1982
Source . . . . .	*
Ingot Position . . . . .	Mid
Process Temperature . . . . .	1650 degF
Rolling Conditions . . . . .	85 %
Final Temperature . . . . .	1200 degF
Cold Work Strain . . . . .	*
Aging Time . . . . .	*
Producer . . . . .	*
Addl Info . . . . .	No
Melting Practice . . . . .	*
Killing Process . . . . .	*
Process Time . . . . .	6.03 hr
Final Processing . . . . .	A,Q,T
Final Time . . . . .	5 hr
Aging Temperature . . . . .	*
Location . . . . .	*
<b>Property Measurements</b>	
Test Type . . . . .	Tensile
Specimen Type . . . . .	*
Gage Length . . . . .	*
Tensile Strength Offset . . . . .	*
Tensile Modulus . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Specimen Thickness . . . . .	*
Loading Rate . . . . .	*
Uniform Elongation . . . . .	*
Standard Method . . . . .	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	107.5	91.3	*	24	73.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.18

<b>Description</b>		
Material Code	001.008.01M1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	5 in	Composition Type Actual
Composition Position	Ladle	Lot ID B8740-2
Reference	USN-1	
<b>Composition</b>		See Page 17200.1
<b>Fabrication History</b>		See Page 17200.17
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	104
T-L °	-120	108
T-L °	-120	112
T-L °	0	122
T-L °	0	126
T-L °	0	133

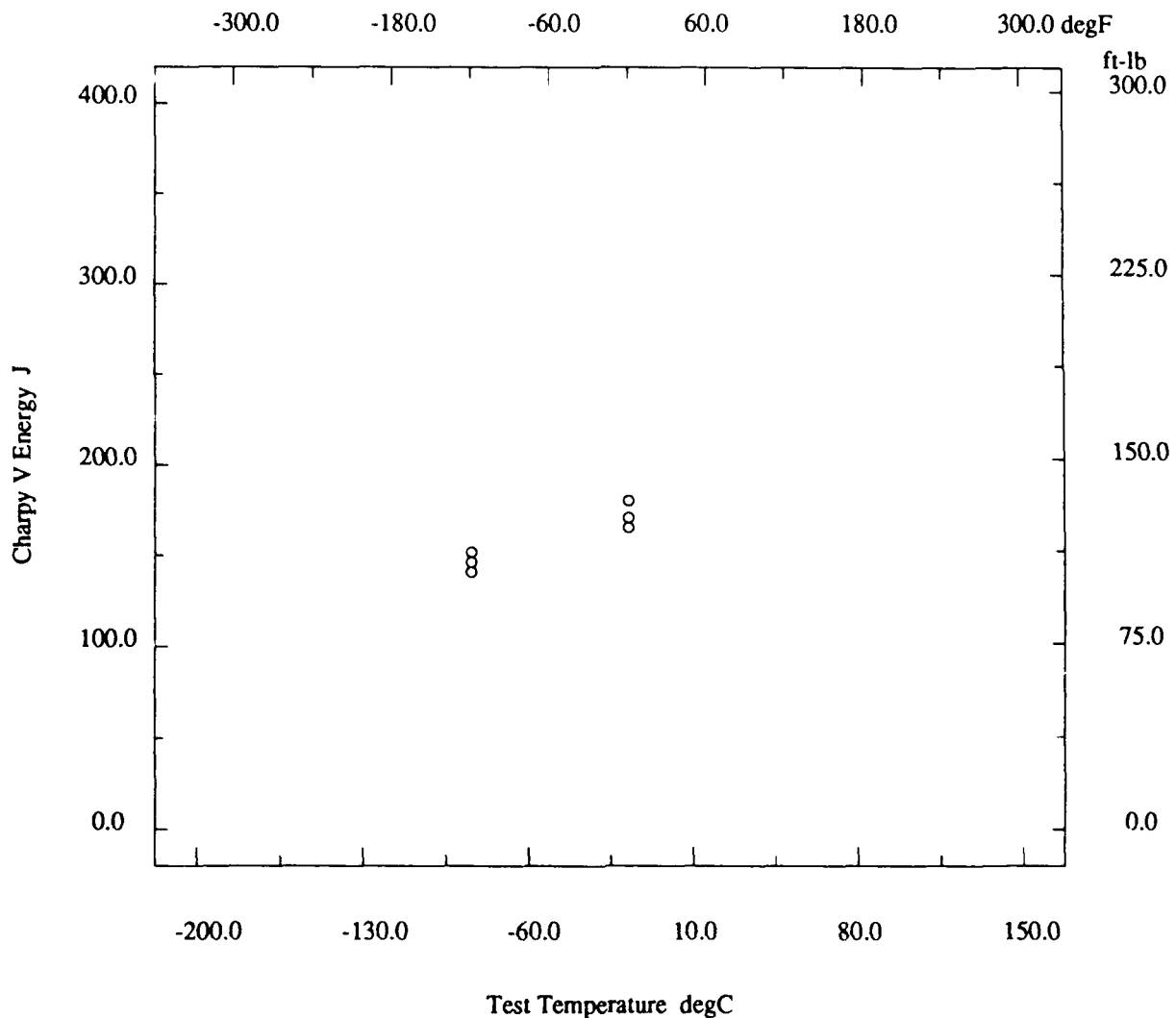
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.19

Description			
Material Code	001.008.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.20

<b>Description</b>			
Material Code	001.008.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.17	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	740	*

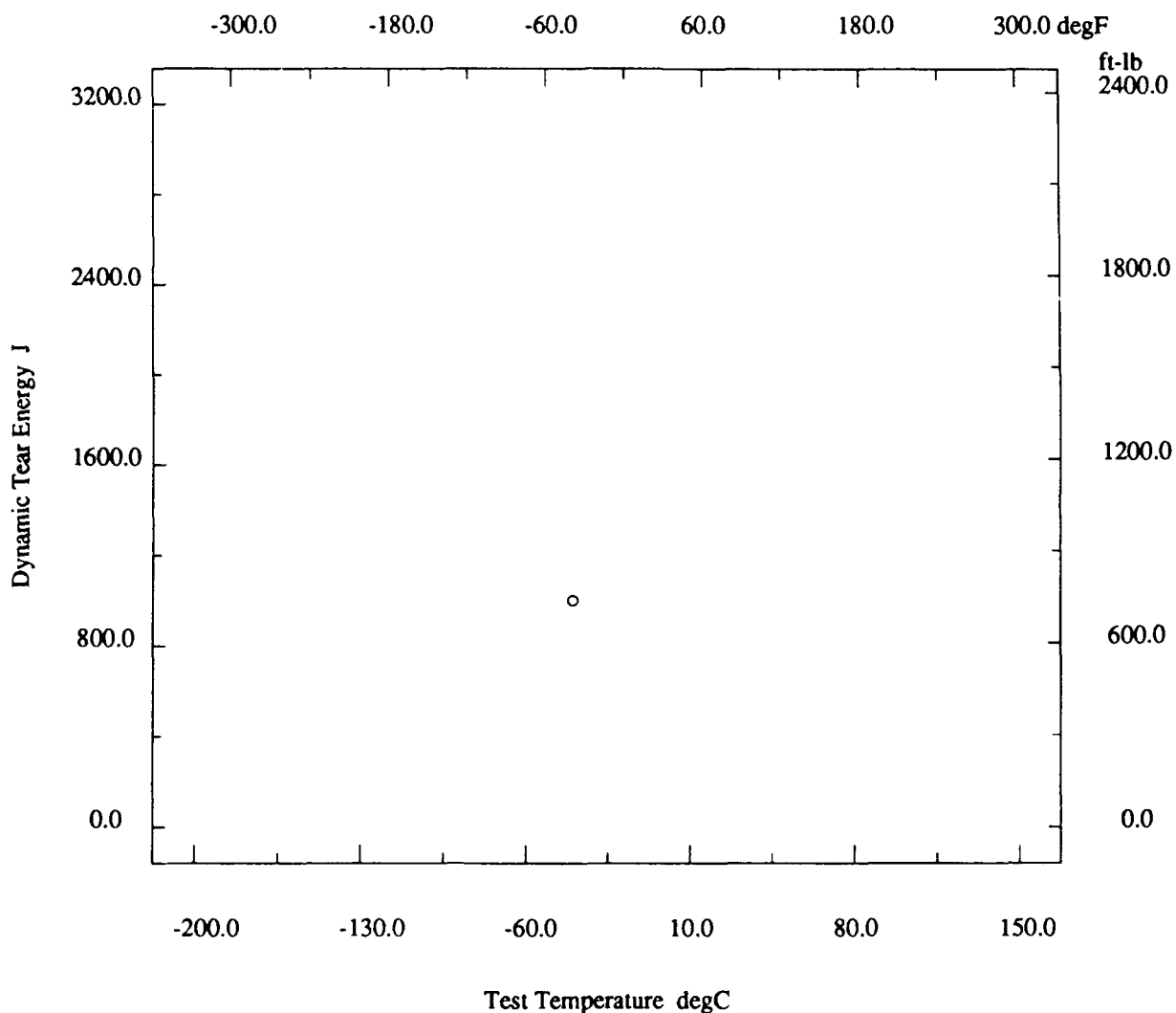
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.21

Description			
Material Code	001.008.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.22

<b>Description</b>						
Material Code	001.008.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-2			
Reference	USN-1					
<b>Composition</b>		See Page 17200.1				
<b>Fabrication History</b>		See Page 17200.17				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	104.5	88.9	*	24	73.5

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17200.23

<b>Description</b>	
Material Code .....	001.008.01MM
UNS .....	*
Type .....	Wrought Metal
Thickness .....	5 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	B8740-2
<b>Composition</b>	
See Page 17200.1	
<b>Fabrication History</b>	
See Page 17200.17	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	1/4T
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	100
T-L °	-120	104
T-L °	-120	98
T-L °	0	134
T-L °	0	140
T-L °	0	142

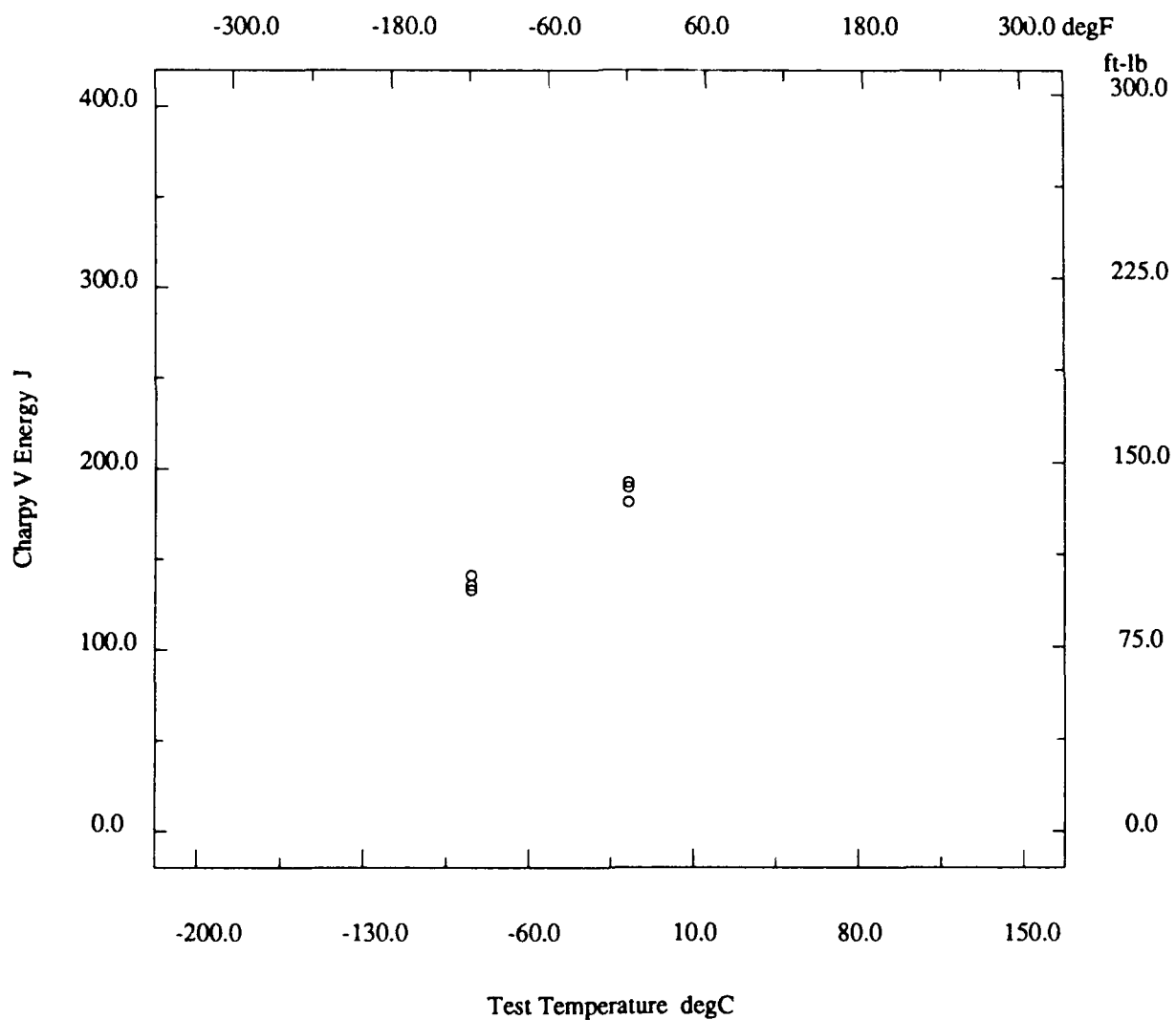
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.24

Description			
Material Code	001.008.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.25

<b>Description</b>			
Material Code	001.008.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.17	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	750	*

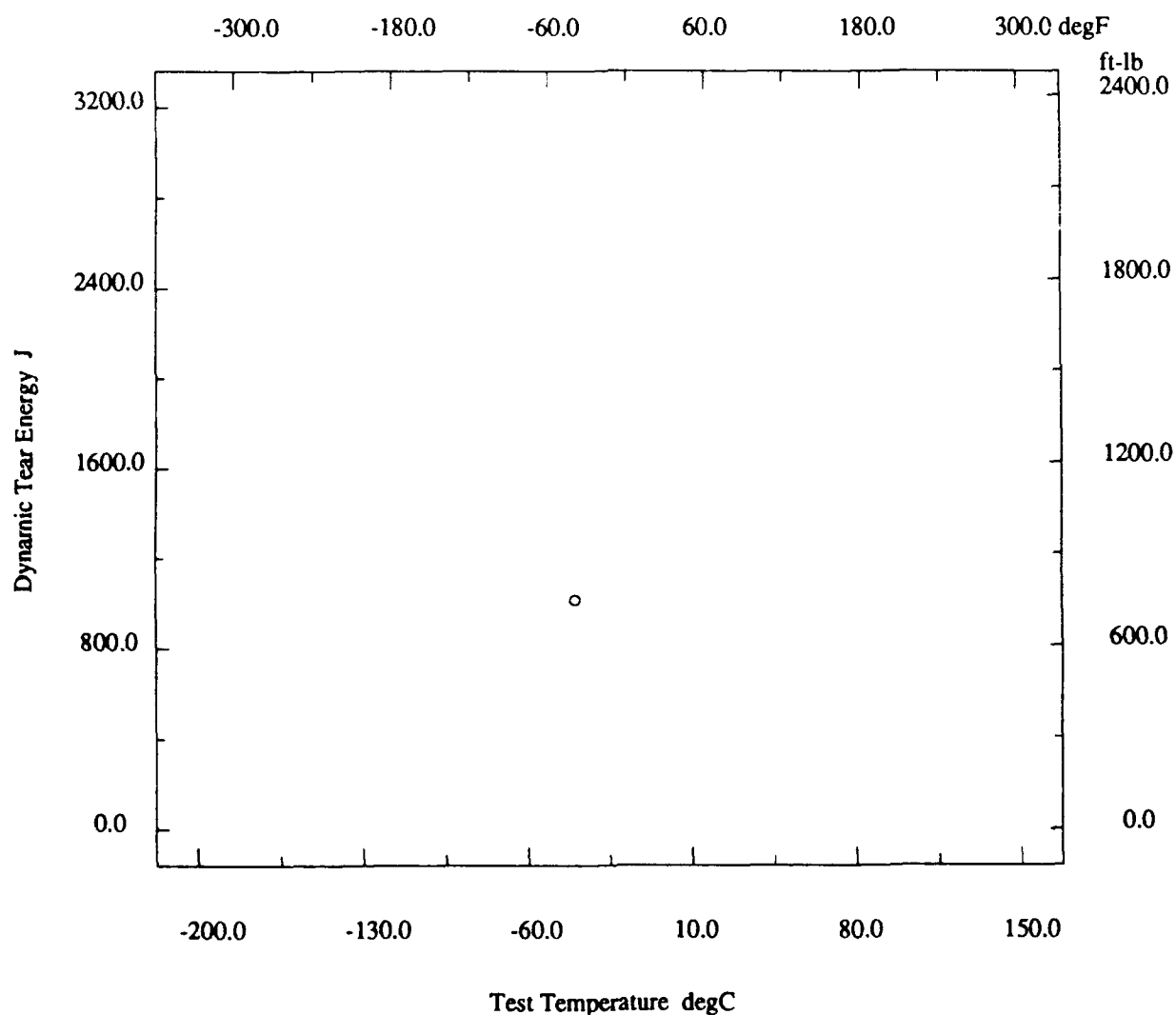
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.26

Description			
Material Code	001.008.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.27

<b>Description</b>						
Material Code	001.008.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-2			
Reference	USN-1					
<b>Composition</b>		See Page 17200.1				
<b>Fabrication History</b>		See Page 17200.17				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	102.0	83.3	*	23	70.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.28

<b>Description</b>	
Material Code .....	001.008.01M2
UNS .....	*
Type .....	Wrought Metal
Thickness .....	5 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	B8740-2
<b>Composition</b>	
See Page 17200.1	
<b>Fabrication History</b>	
See Page 17200.17	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	1/4T
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	90
T-L °	-120	90
T-L °	-120	94
T-L °	0	110
T-L °	0	110
T-L °	0	120

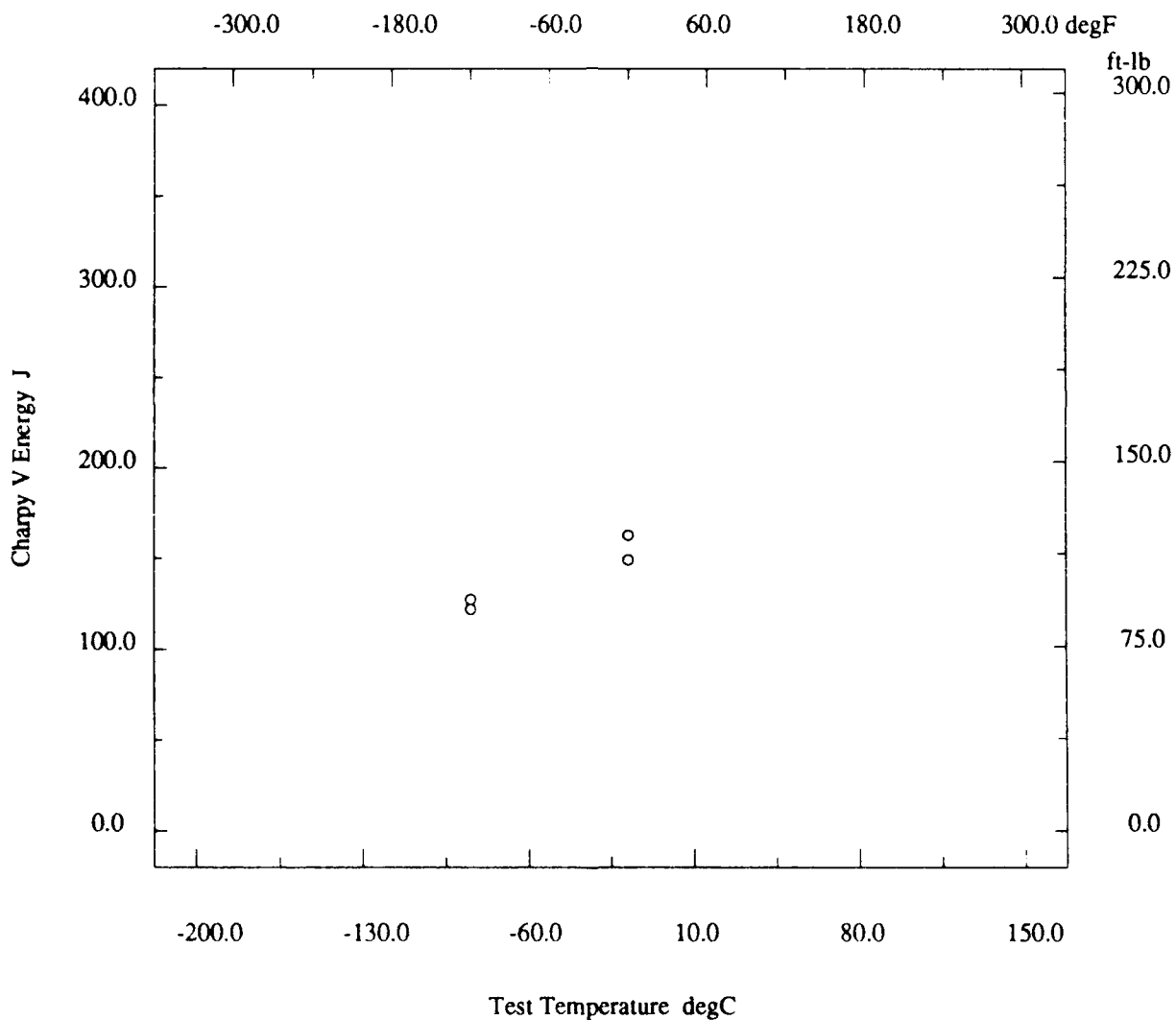
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.29

Description			
Material Code	001.008.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.30

<b>Description</b>			
Material Code	001.008.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.17	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	830	*

\* - not reported

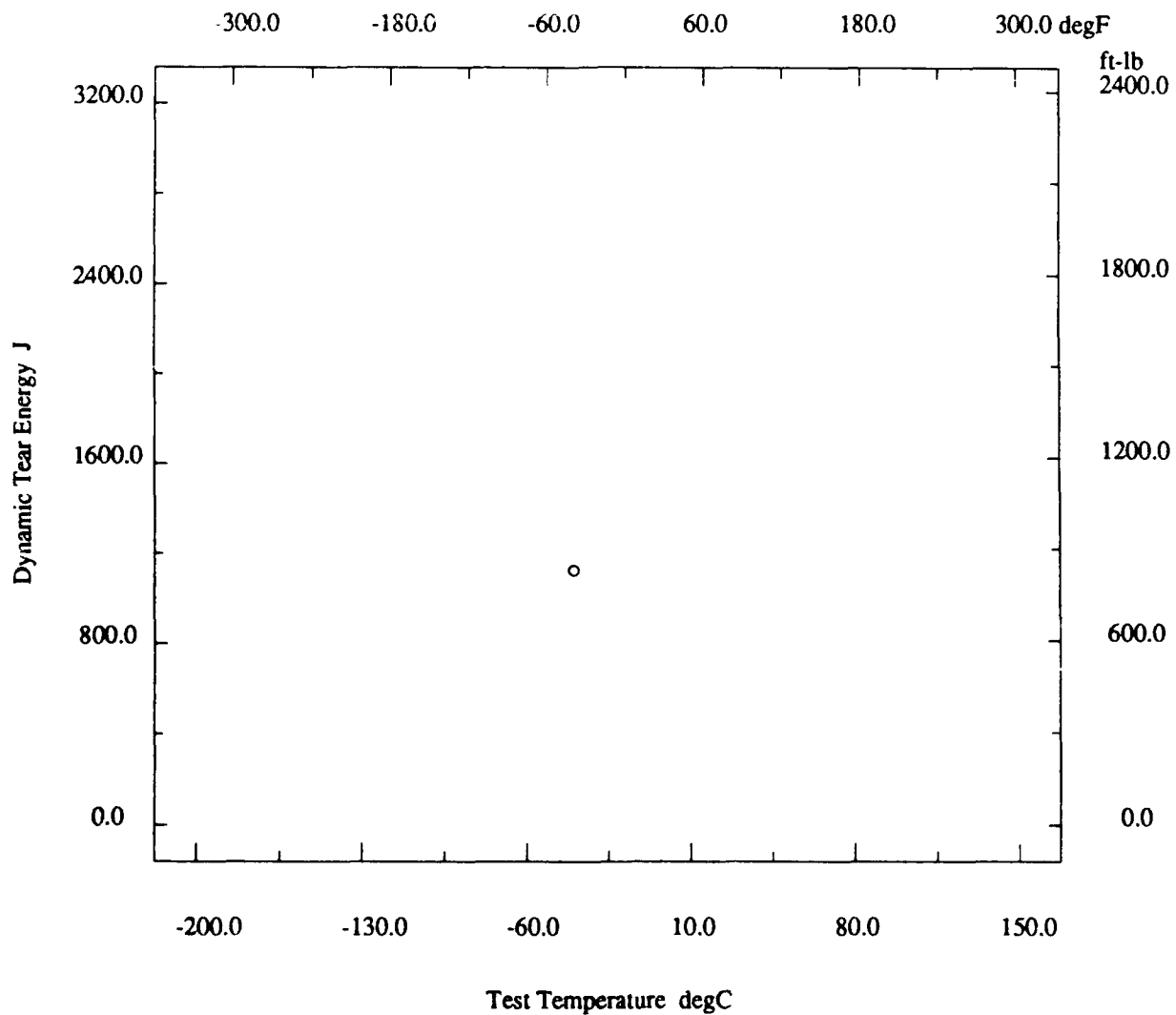


# Marine Structural Toughness Data Bank

Material HY80

Page 17200.31

Description			
Material Code	001.008.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.32

<b>Description</b>							
Material Code	001.008.01B1	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	5 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	B8740-2				
Reference	USN-1						
<b>Composition</b>		See Page 17200.1					
<b>Fabrication History</b>							
Heat Treatment	A,Q,T	Producer	*				
Year Produced	1982	Addl Info	No				
Source	*	M..ling Practice	*				
Ingot Position	Bottom	Killing Process	*				
Process Temperature	1650 degF	Process Time	6.03 hr				
Rolling Conditions	85 %	Final Processing	A,Q,T				
Final Temperature	1200 degF	Final Time	5 hr				
Cold Work Strain	*	Aging Temperature	*				
Aging Time	*	Location	*				
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	105.0	86.5	*	23	73.6	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.33

<b>Description</b>	
Material Code . . . . . 001.008.01B1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 5 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . B8740-2
Reference . . . . . USN-1	
<b>Composition</b>	See Page 17200.1
<b>Fabrication History</b>	See Page 17200.32
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	100
T-L °	-120	102
T-L °	-120	104
T-L °	0	122
T-L °	0	128
T-L °	0	140

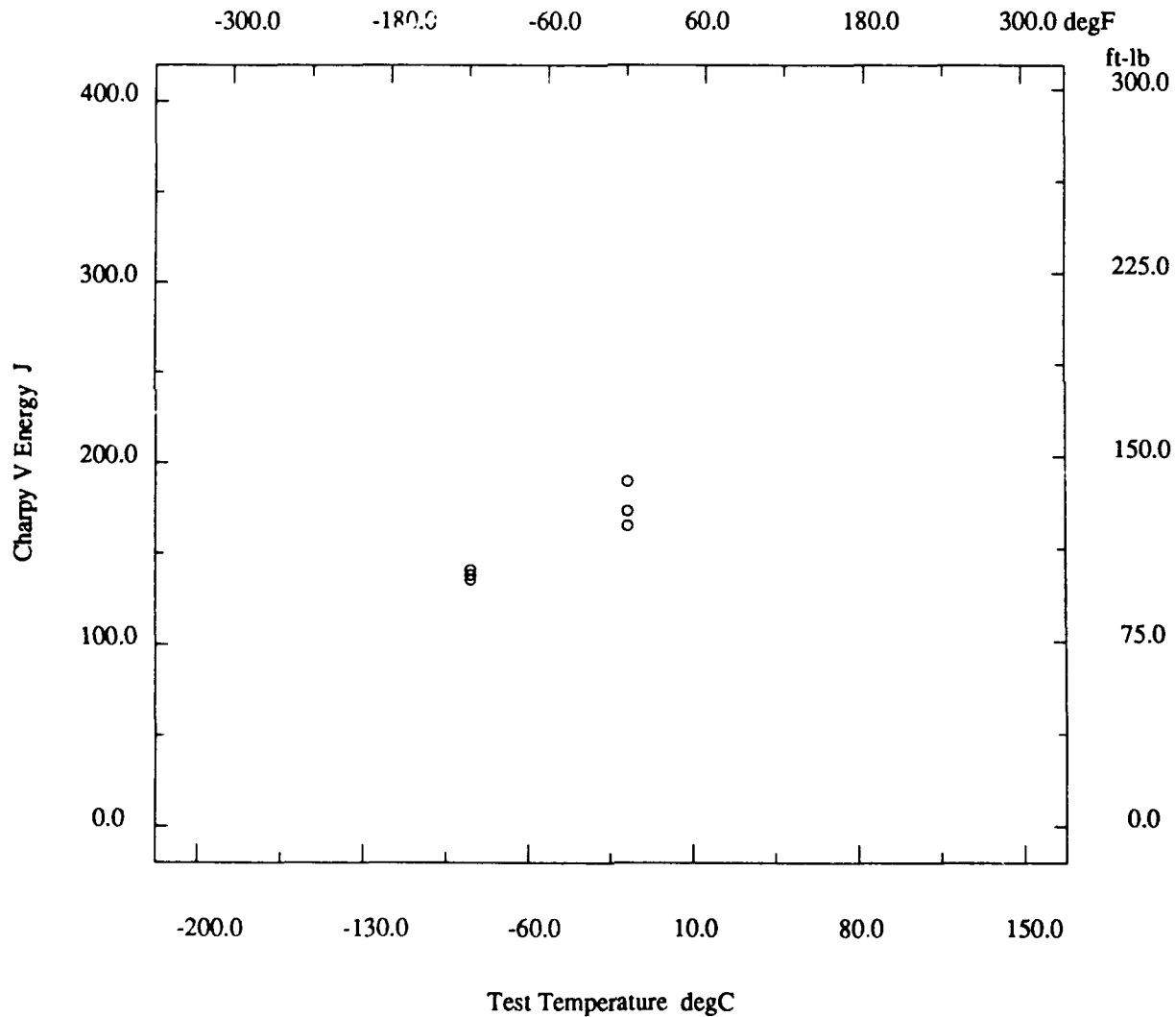
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.34

Description			
Material Code	001.008.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.35

<b>Description</b>			
Material Code	001.008.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		

<b>Composition</b>	See Page 17200.1
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<b>Fabrication History</b>	See Page 17200.32
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	680	*

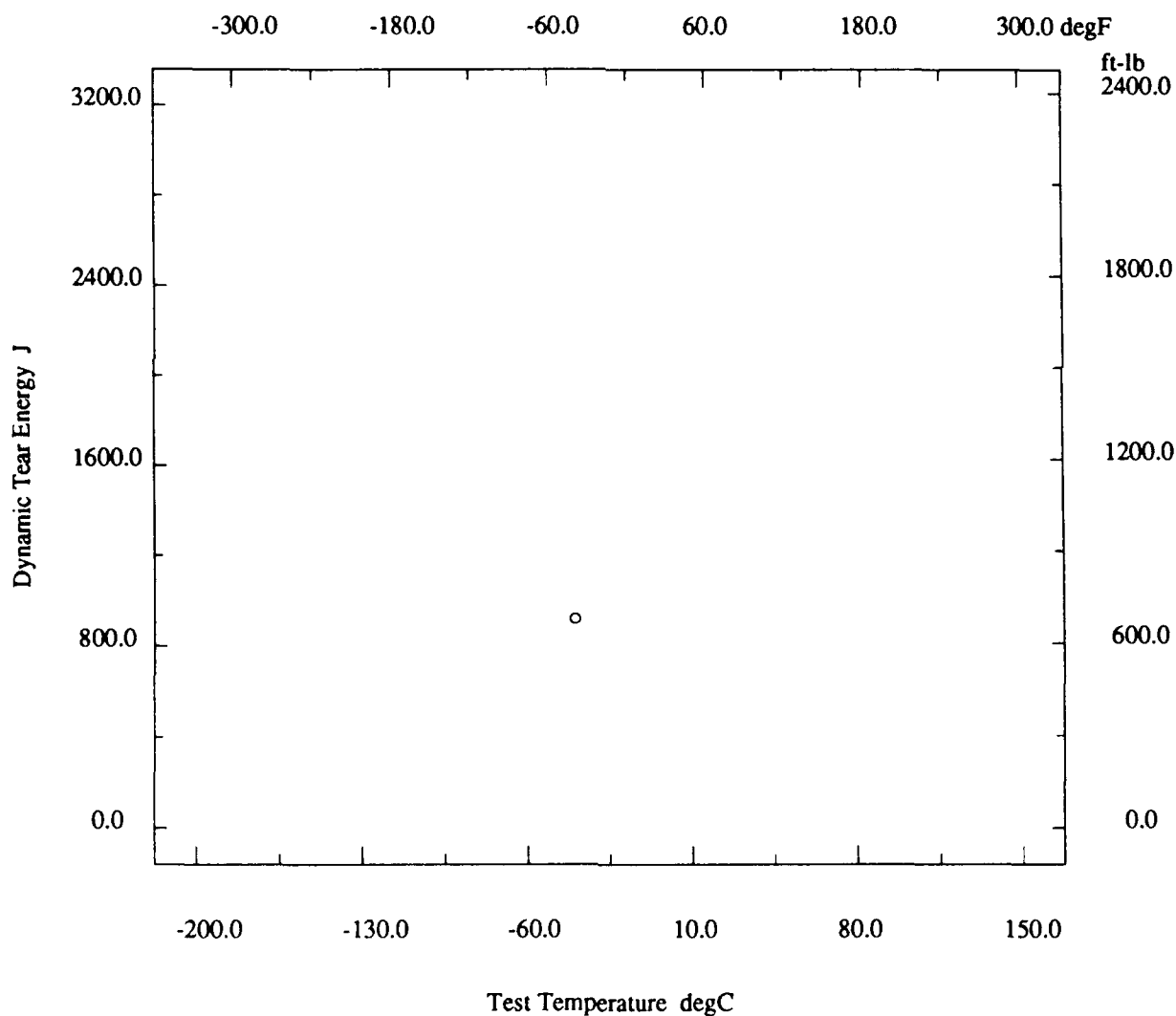
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.36

Description			
Material Code	001.008.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.37

<b>Description</b>						
Material Code	001.008.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-2			
Reference	USN-1					
<b>Composition</b>		See Page 17200.1				
<b>Fabrication History</b>		See Page 17200.32				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.5	88.3	*	23	72.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.38

<b>Description</b>			
Material Code	001.008.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		

<b>Composition</b>	See Page 17200.1
<b>Fabrication History</b>	See Page 17200.32

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-120	100
T-L ◯	-120	108
T-L ◯	-120	94
T-L ◯	0	110
T-L ◯	0	118
T-L ◯	0	136

\* - not reported

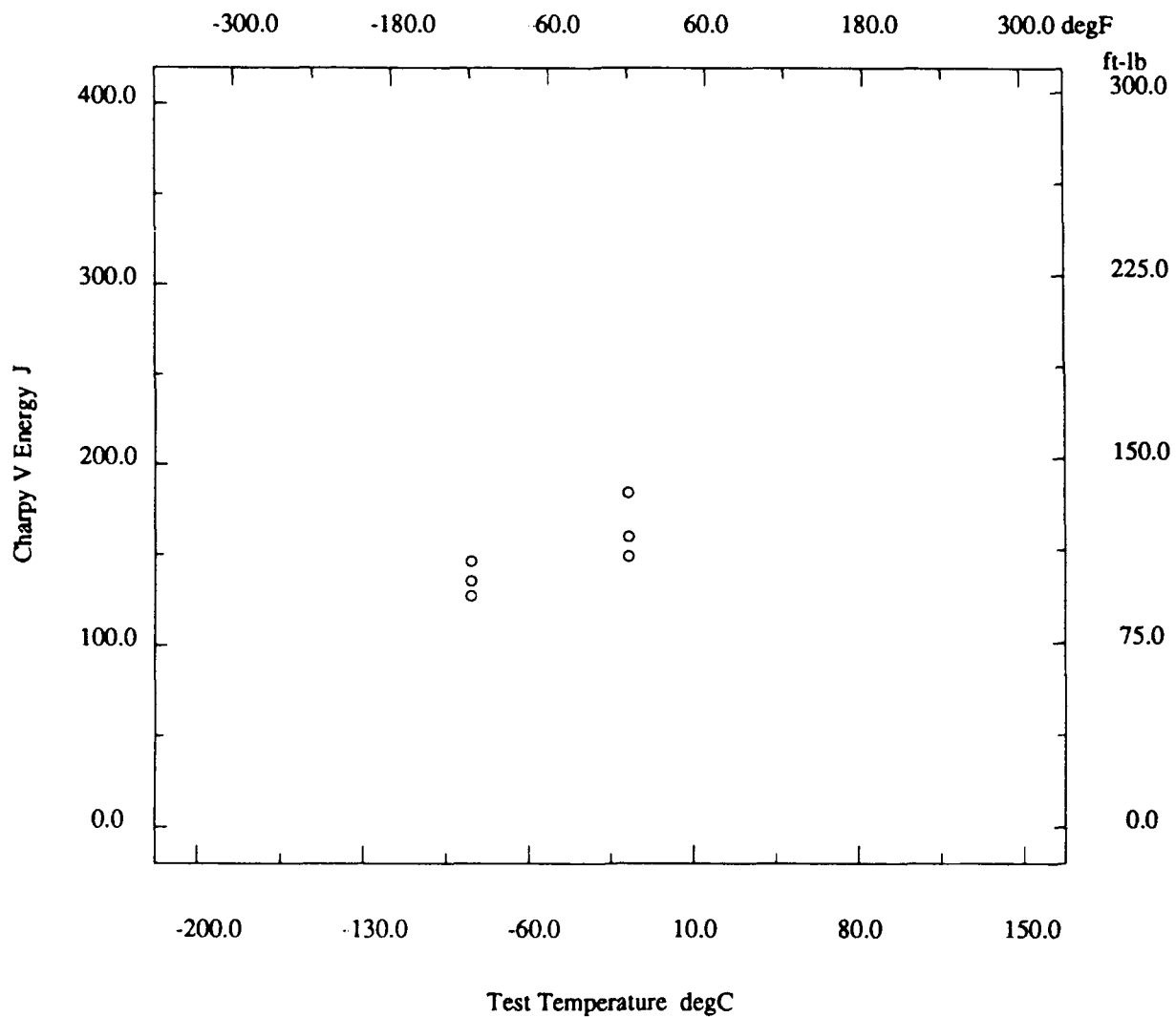


# Marine Structural Toughness Data Bank

Material HY80

Page 17200.39

Description			
Material Code	001.008.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.40

<b>Description</b>			
Material Code	001.008.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.32	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

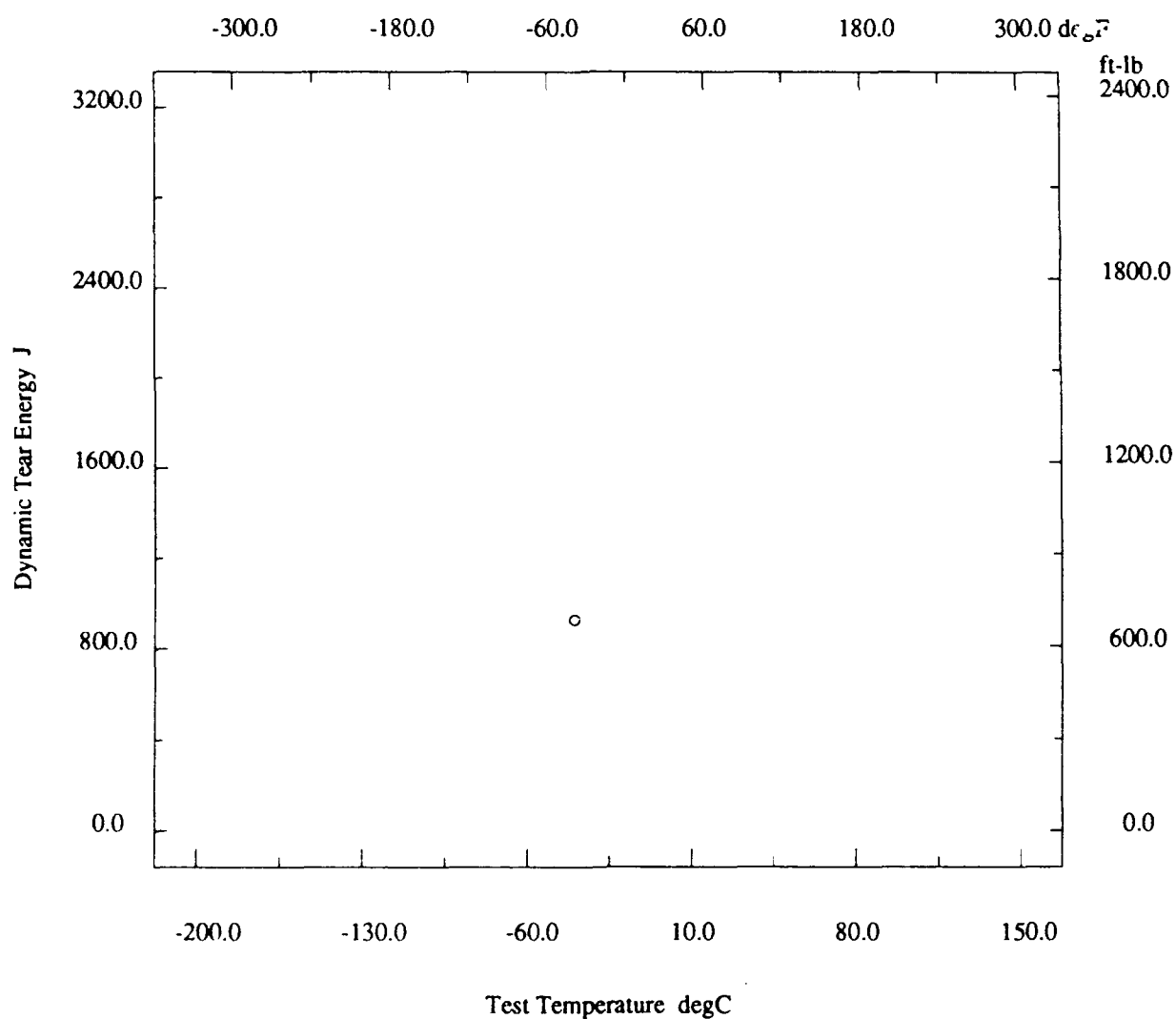
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	685	*

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.41

Description			
Material Code	001.008.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.42

<b>Description</b>						
Material Code	001.008.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8740-2			
Reference	USN-1					
<b>Composition</b>		See Page 17200.1				
<b>Fabrication History</b>		See Page 17200.32				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	106.0	89.1	*	23	73.4

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.43

<b>Description</b>		
Material Code	001.008.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8740-2

## Composition

See Page 17200.1

## Fabrication History

See Page 17200.32

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	104
T-L ◊	-120	104
T-L ◊	-120	94
T-L ◊	0	130
T-L ◊	0	146
T-L ◊	0	146

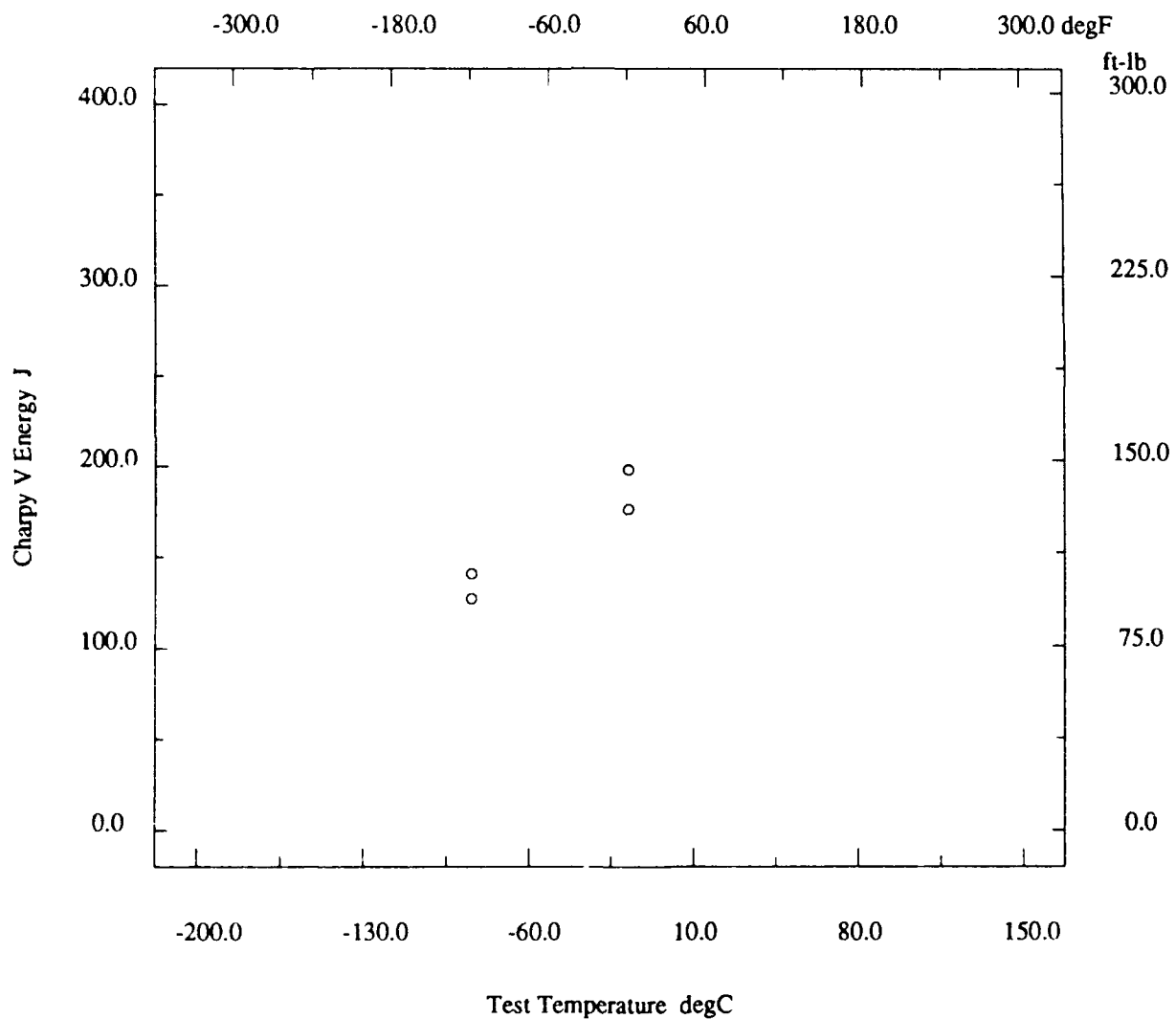
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.44

Description			
Material Code	001.008.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.45

<b>Description</b>			
Material Code	001.008.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8740-2
Reference	USN-1		
<b>Composition</b>		See Page 17200.1	
<b>Fabrication History</b>		See Page 17200.32	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	695	*

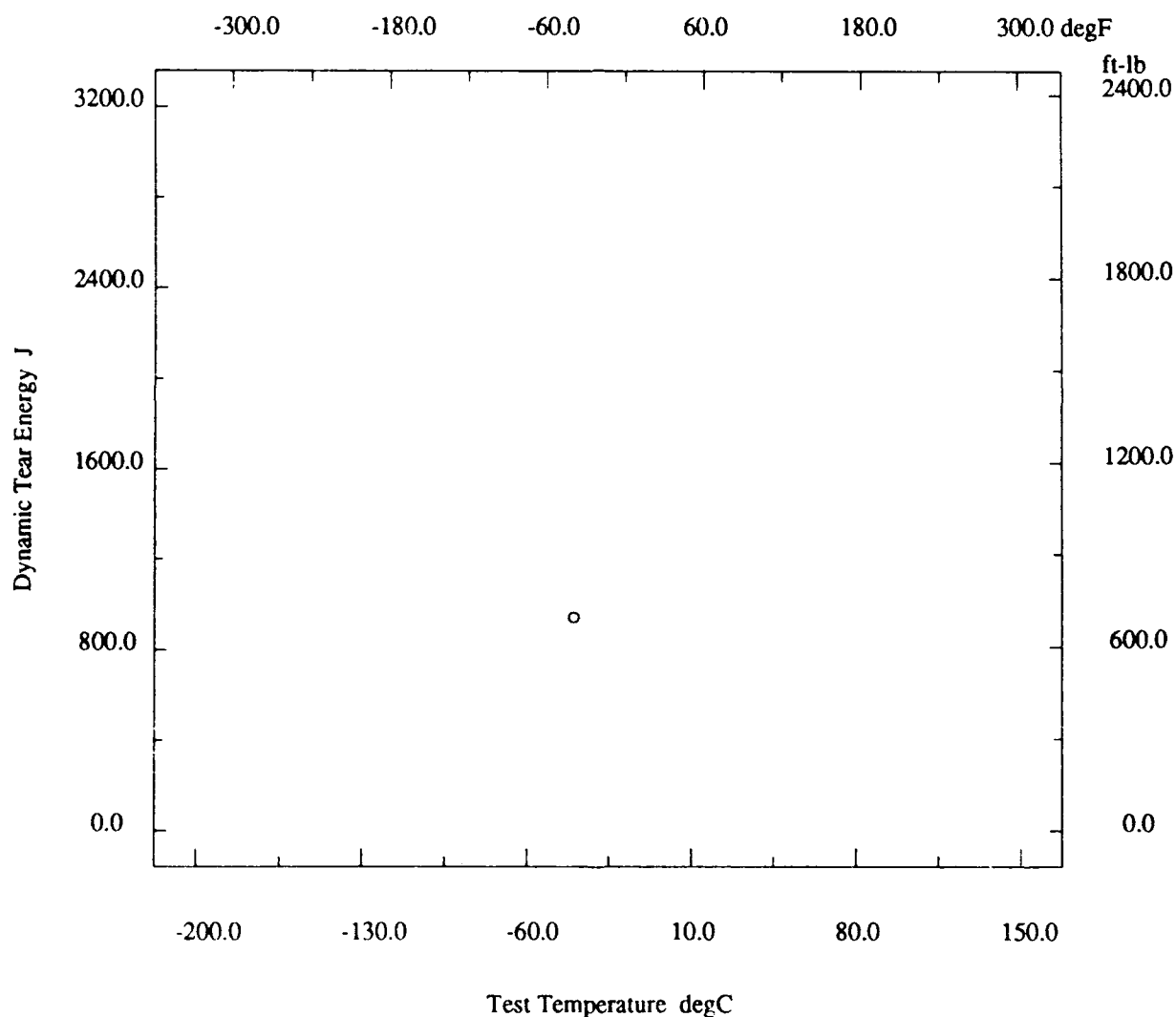
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17200.46

<b>Description</b>			
Material Code	001.008.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	I,adle	Lot ID	B8740-2
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17300.1

Description						
Material Code	001.009.01T1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8563-4			
Reference	USN-1					
Composition						
C	0.17 %	Mn	0.35 %			
P	0.012 %	S	0.01 %			
Si	0.20 %	Cr	1.54 %			
Ni	2.67 %	Mo	0.39 %			
V	0.01 %	Cu	0.14 %			
Cb	*	Ti	0.003 %			
B	*	Al	0.009 %			
N	*	Other Components	As=0.009;Sn=0.013;Sb=0.004 %			
Fabrication History						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Top	Killing Process	*			
Process Temperature	1650 degF	Process Time	5.25 hr			
Rolling Conditions	85 %	Final Processing	A,Q,T			
Final Temperature	1200 degF	Final Time	6.08 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
Property Measurements						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.0	89.2	*	23	66.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.2

Description			
Material Code	001.009.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		

**Composition** See Page 17300.1

**Fabrication History** See Page 17300.1

Property Measurements			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	84
L-T °	-120	88
L-T °	-120	94
L-T °	-120	96
L-T °	-120	98
L-T °	-40	122
L-T °	-40	126
L-T °	-40	126
L-T °	-40	127
L-T °	-40	128
L-T °	0	124
L-T °	0	125
L-T °	0	125
L-T °	0	138
L-T °	0	140
L-T °	32	136
L-T °	32	138
L-T °	32	140
L-T °	32	140
L-T °	32	142
L-T °	70	128
L-T °	70	130
L-T °	70	130
L-T °	70	130
L-T °	70	131
T-L ▲	-120	50
T-L ▲	-120	58
T-L ▲	-120	68
T-L ▲	-120	76
T-L ▲	-120	80
T-L ▲	-40	102
T-L ▲	-40	104
T-L ▲	-40	104

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	104
T-L Δ	-40	98
T-L Δ	0	112
T-L Δ	0	112
T-L Δ	0	114
T-L Δ	0	117
T-L Δ	0	119
T-L Δ	32	110
T-L Δ	32	110
T-L Δ	32	111
T-L Δ	32	112
T-L Δ	32	112
T-L Δ	70	110
T-L Δ	70	115
T-L Δ	70	115
T-L Δ	70	118
T-L Δ	70	121

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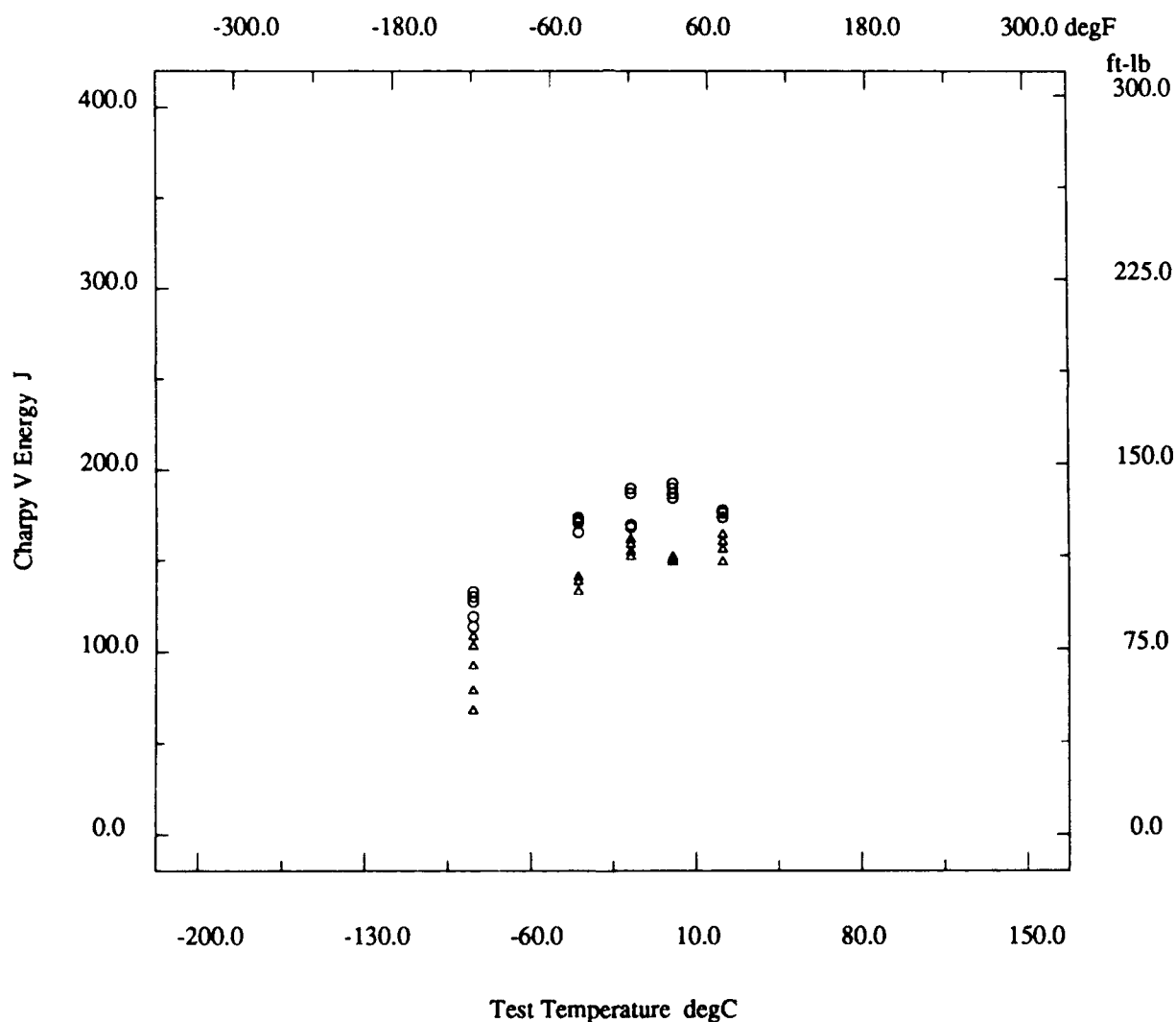
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.4

<b>Description</b>			
Material Code	001.009.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.5

<b>Description</b>						
Material Code	001.009.01TM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8563-4			
Reference	USN-1					
<b>Composition</b>		See Page 17300.1				
<b>Fabrication History</b>		See Page 17300.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	106.0	88.0	*	23	69.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.6

<b>Description</b>			
Material Code	001.009.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		
<b>Composition</b>		See Page 17300.1	
<b>Fabrication History</b>		See Page 17300.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	58
T-L °	-120	60
T-L °	-120	69
T-L °	0	100
T-L °	0	100
T-L °	0	102

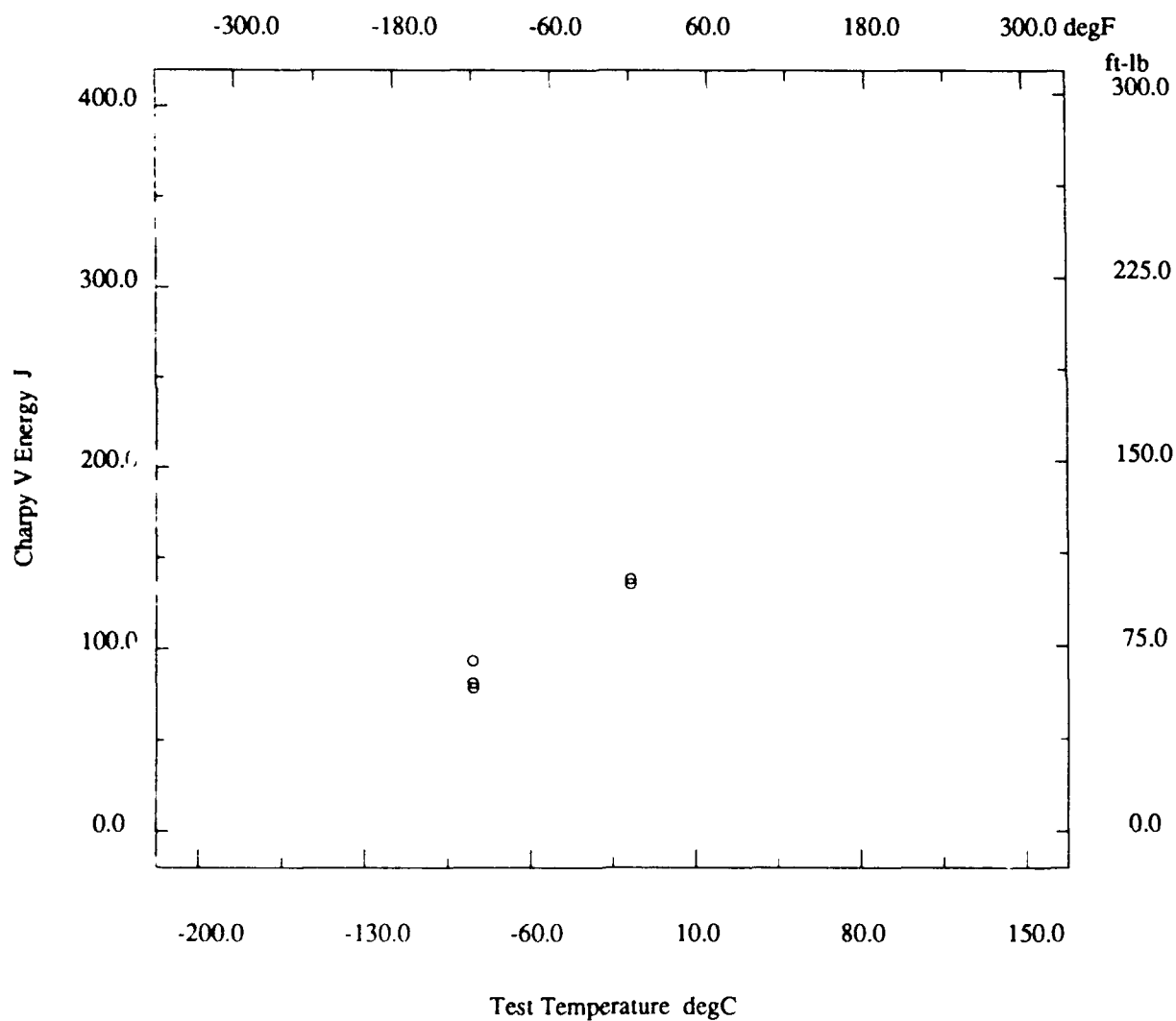
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.7

Description			
Material Code	001.009.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.8

<b>Description</b>						
Material Code	001.009.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	5 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8563-4			
Reference	USN-1					
<b>Composition</b>		See Page 17300.1				
<b>Fabrication History</b>		See Page 17300.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp deg F	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	107.0	90.3	*	24	69.0

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17300.9

<b>Description</b>		
Material Code	001.009.01T2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8563-4

<b>Composition</b>	See Page 17300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17300.1
----------------------------	------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

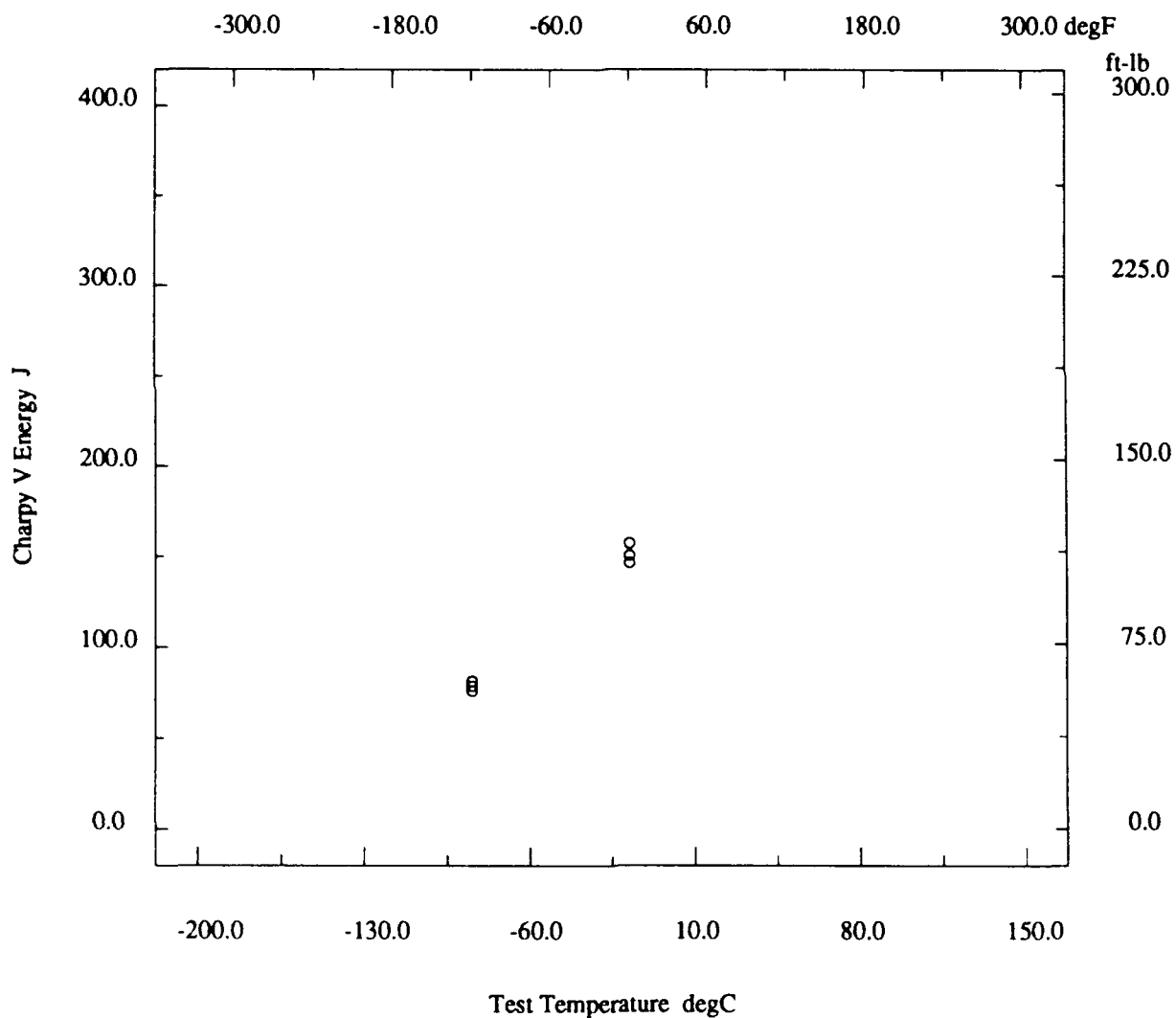
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	56
T-L °	-120	58
T-L °	-120	60
T-L °	0	108
T-L °	0	111
T-L °	0	116

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.10

Description			
Material Code	001.009.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.11

<b>Description</b>	
Material Code . . . . . 001.009.01B1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 5 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . B8563-4
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 17300.1	
<b>Fabrication History</b>	
Heat Treatment . . . . . A,Q,T	Producer . . . . . *
Year Produced . . . . . 1982	Addl Info . . . . . No
Source . . . . . *	Melting Practice . . . . . *
Ingot Position . . . . . Bottom	Killing Process . . . . . *
Process Temperature . . . . . 1650 degF	Process Time . . . . . 5.25 hr
Rolling Conditions . . . . . 85 %	Final Processing . . . . . A,Q,T
Final Temperature . . . . . 1200 degF	Final Time . . . . . 6.08 hr
Cold Work Strain . . . . . *	Aging Temperature . . . . . *
Aging Time . . . . . *	Location . . . . . *
<b>Property Measurements</b>	
Test Type . . . . . Tensile	Position . . . . . 1/4T
Specimen Type . . . . . *	Specimen Thickness . . . . . *
Gage Length . . . . . *	Loading Rate . . . . . *
Tensile Strength Offset . . . . . *	Uniform Elongation . . . . . *
Tensile Modulus . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	104.0	91.4	*	22	71.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.12

<b>Description</b>		
Material Code	001.009.01B1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8563-4

**Composition** See Page 17300.1

**Fabrication History** See Page 17300.11

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	60
T-L °	-120	78
T-L °	-120	80
T-L °	0	126
T-L °	0	130
T-L °	0	132

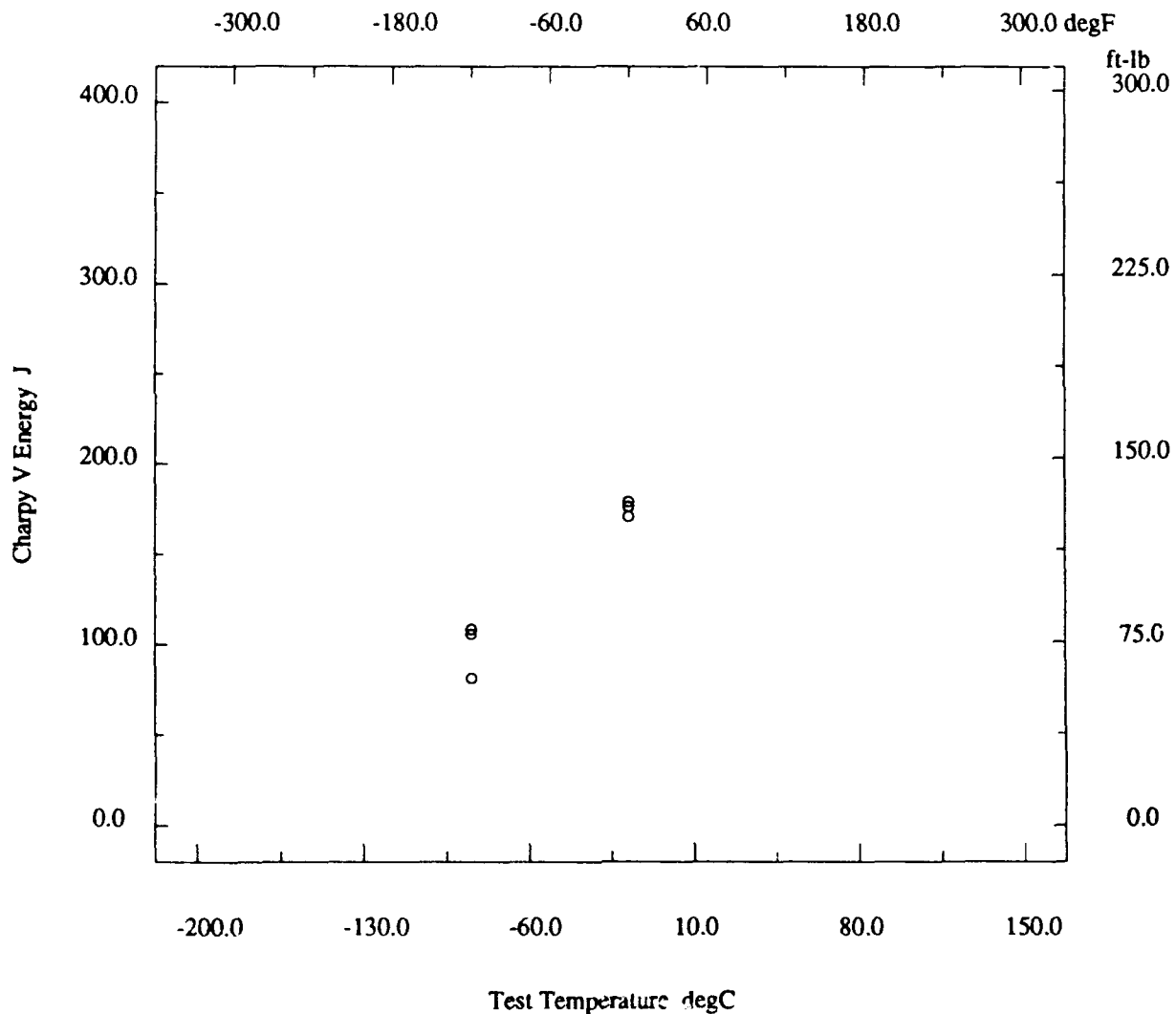
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.13

Description			
Material Code	001.009.01B1	Material Name	HY80
UNS	*	Other Designation	
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.14

<b>Description</b>							
Material Code	001.009.01BM	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	5 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	B8563-4				
Reference	USN-1						
<b>Composition</b>		See Page 17300.1					
<b>Fabrication History</b>		See Page 17300.11					
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	106.5	95.9	*	22	67.0	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.15

<b>Description</b>			
Material Code	001.009.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		

**Composition** See Page 17300.1

**Fabrication History** See Page 17300.11

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	63
T-L ◊	-120	72
T-L ◊	-120	84
T-L ◊	0	128
T-L ◊	0	128
T-L ◊	0	128

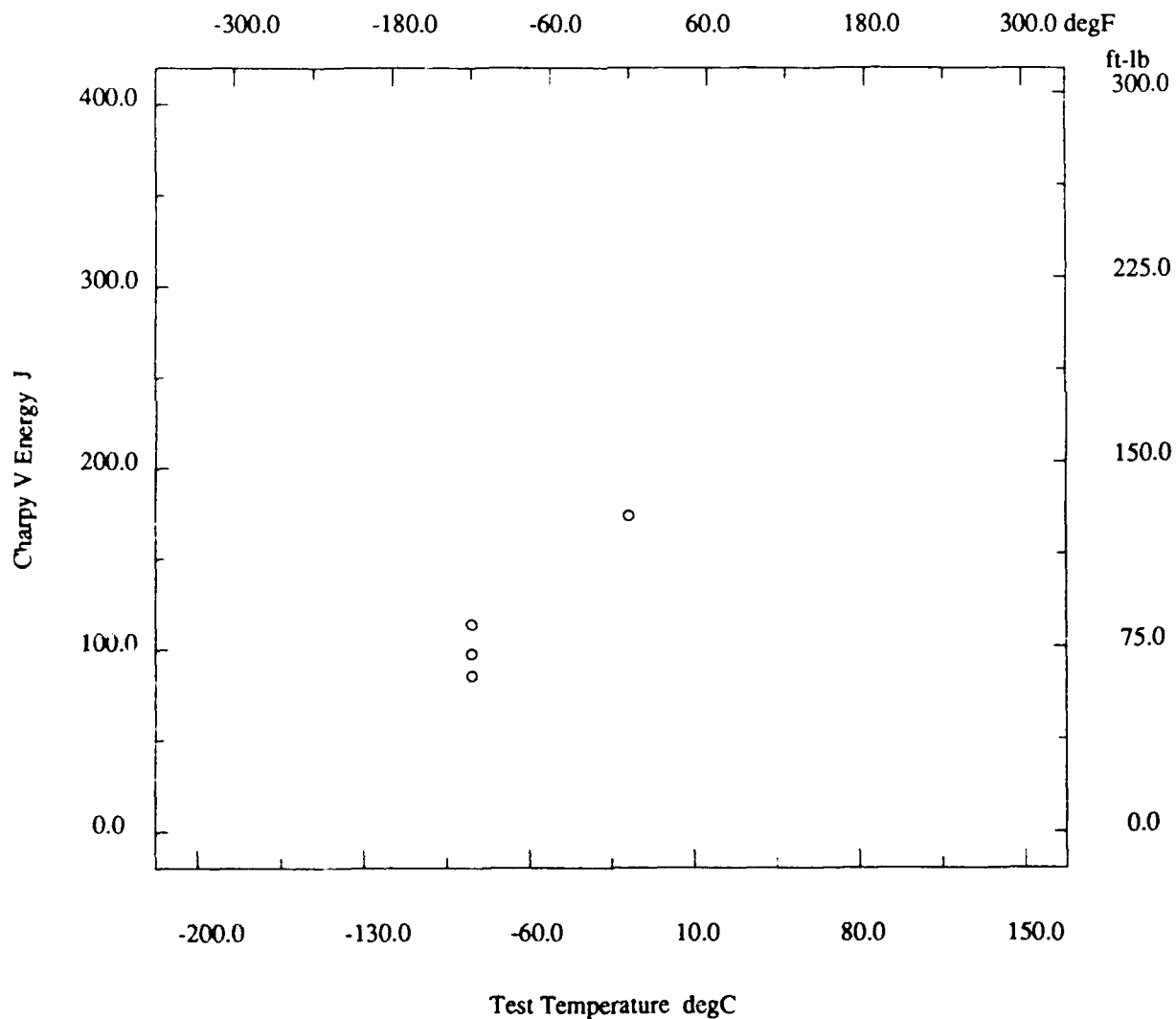
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.16

Description			
Material Code	001.009.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17300.17

<b>Description</b>		
Material Code	001.009.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8563-4

<b>Composition</b>	See Page 17300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17300.11
----------------------------	-------------------

<b>Property Measurements</b>	
Test Type	Tensile
Specimen Type	*
Gage Length	*
Tensile Strength Offset	*
Tensile Modulus	*
Standard Year	*
Position	1/4T
Specimen Thickness	*
Loading Rate	*
Uniform Elongation	*
Standard Method	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.0	87.2	*	21	67.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.18

Description			
Material Code	001.009.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		

**Composition** See Page 17300.1

**Fabrication History** See Page 17300.11

Property Measurements			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	58
T-L ◦	-120	60
T-L ◦	-120	63
T-L ◦	0	118
T-L ◦	0	128
T-L ◦	0	130

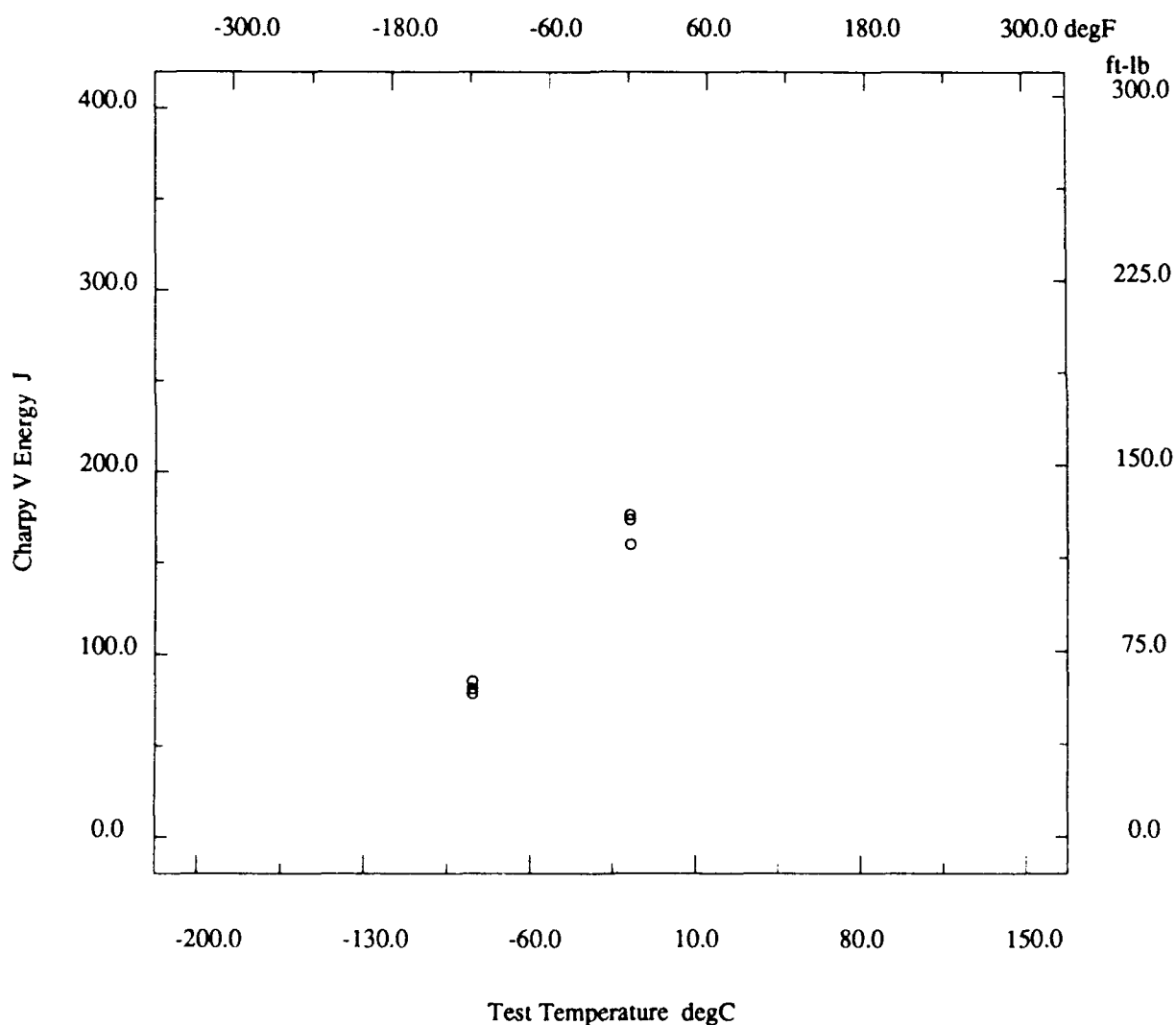
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17300.19

Description			
Material Code	001.009.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8563-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.1

Description						
Material Code	001.010.01T1					
UNS	*					
Type	Wrought Metal					
Thickness	3.25 in					
Composition Position	Ladle					
Reference	USN-1					
Material Name		HY80				
Other Designation		*				
Form		Plate				
Composition Type		Actual				
Lot ID		D2580-4				
Composition						
C	0.15 %	Mn	0.27 %			
P	0.006 %	S	0.013 %			
Si	0.23 %	Cr	1.47 %			
Ni	2.75 %	Mo	0.38 %			
V	0.00 %	Cu	0.15 %			
Cb	*	Ti	0.003 %			
B	*	Al	0.027 %			
N	*	Other Components	As=0.007;Sn=0.010;Sb=0.008 %			
Fabrication History						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1981	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Top	Killing Process	*			
Process Temperature	1660 degF	Process Time	3.25 hr			
Rolling Conditions	90 %	Final Processing	A,Q,T			
Final Temperature	1220 degF	Final Time	3.25 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
Property Measurements						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	105.0	84.4	*	23	66.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.2

<b>Description</b>			
Material Code	001.010.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		
<b>Composition</b>		See Page 17400.1	
<b>Fabrication History</b>		See Page 17400.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	112
L-T °	-120	120
L-T °	-120	120
L-T °	-120	124
L-T °	-120	132
L-T °	-40	142
L-T °	-40	143
L-T °	-40	144
L-T °	-40	146
L-T °	-40	148
L-T °	0	140
L-T °	0	140
L-T °	0	140
L-T °	0	141
L-T °	0	152
L-T °	32	134
L-T °	32	140
L-T °	32	148
L-T °	32	152
L-T °	32	152
L-T °	70	138
L-T °	70	138
L-T °	70	142
L-T °	70	144
L-T °	70	148
T-L ^	-120	72
T-L ^	-120	82
T-L ^	-120	88
T-L ^	-120	90
T-L ^	-120	96
T-L ^	-40	100
T-L ^	-40	101
T-L ^	-40	108

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	110
T-L Δ	-40	120
T-L Δ	0	110
T-L Δ	0	112
T-L Δ	0	120
T-L Δ	0	120
T-L Δ	0	92
T-L Δ	32	107
T-L Δ	32	110
T-L Δ	32	112
T-L Δ	32	116
T-L Δ	32	120
T-L Δ	70	108
T-L Δ	70	108
T-L Δ	70	110
T-L Δ	70	112
T-L Δ	70	114

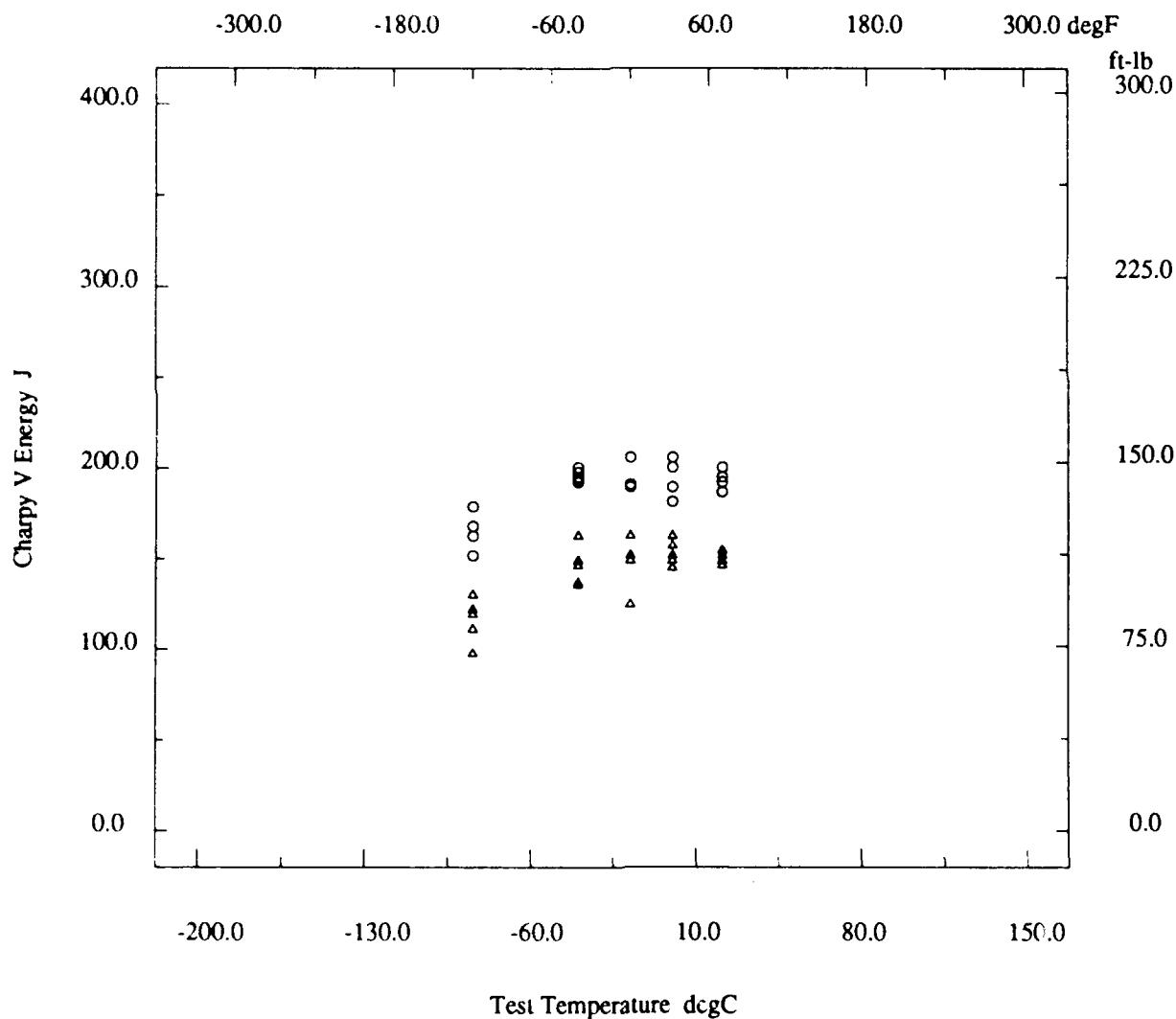
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.4

Description			
Material Code	001.010.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



# Marine Structural Toughness Data Bank

Material HY80

Page 17400.5

<b>Description</b>						
Material Code	001.010.01TM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D2580-4			
Reference	USN-1					
<b>Composition</b>		See Page 17400.1				
<b>Fabrication History</b>		See Page 17400.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	107.0	89.7	*	23	70.5

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17400.6

<b>Description</b>			
Material Code	001.010.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		
<b>Composition</b>		See Page 17400.1	
<b>Fabrication History</b>		See Page 17400.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	68
T-L °	-120	70
T-L °	-120	76
T-L °	0	100
T-L °	0	100
T-L °	0	98

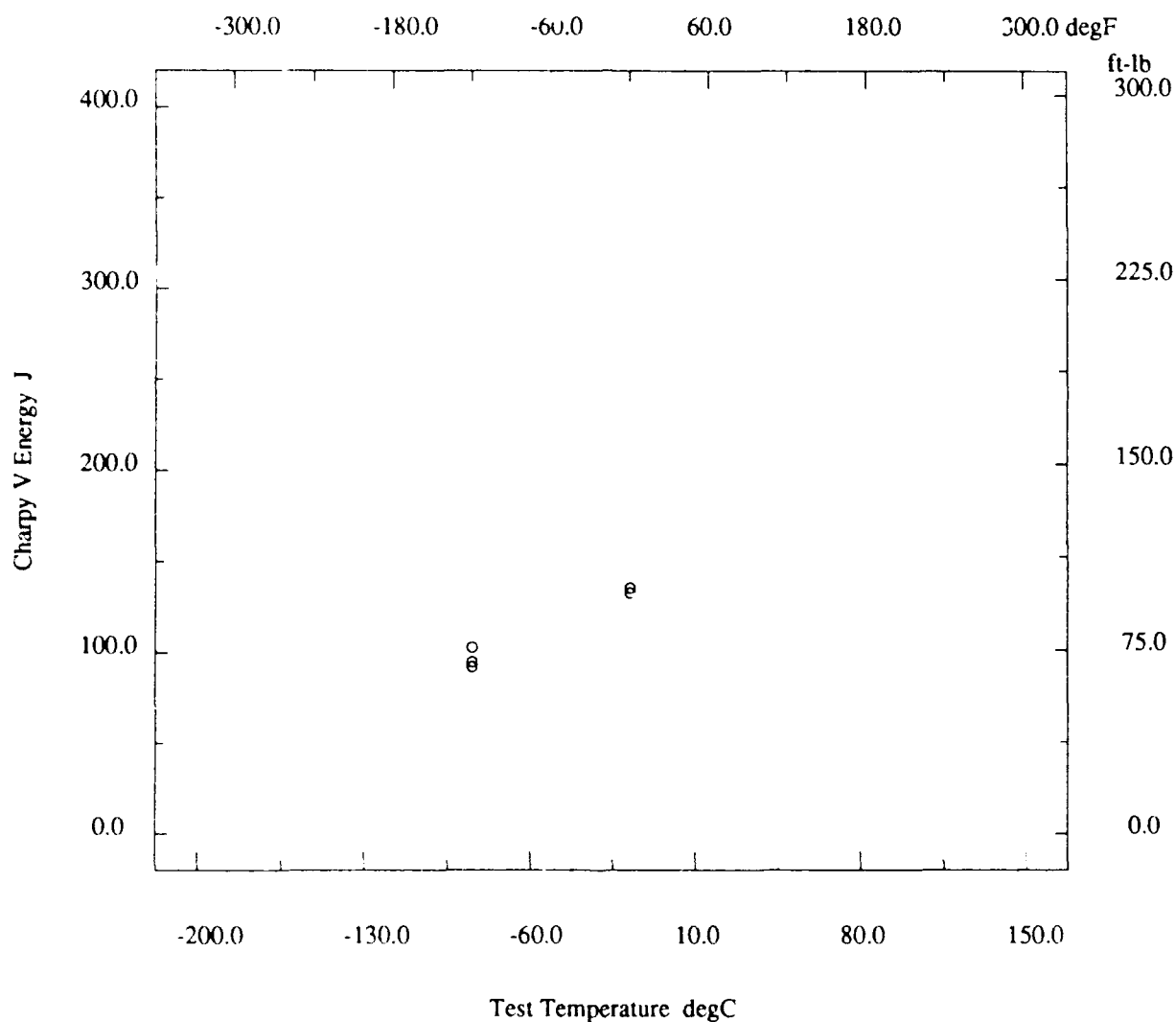
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.7

Description			
Material Code	001.010.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.8

<b>Description</b>						
Material Code	001.010.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D2580-4			
Reference	USN-1					
<b>Composition</b>		See Page 17400.1				
<b>Fabrication History</b>		See Page 17400.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.0	86.7	*	24	68.7

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.9

<b>Description</b>			
Material Code	001.010.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		
<b>Composition</b>		See Page 17400.1	
<b>Fabrication History</b>		See Page 17400.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	90
T-L °	-120	90
T-L °	-120	92
T-L °	0	110
T-L °	0	114
T-L °	0	120

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.9

<b>Description</b>		
Material Code	001.010.01T2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.25 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D2580-4

**Composition** See Page 17400.1

**Fabrication History** See Page 17400.1

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	90
T-L °	-120	90
T-L °	-120	92
T-L °	0	110
T-L °	0	114
T-L °	0	120

\* - not reported

# Marine Structural Toughness Data Bank

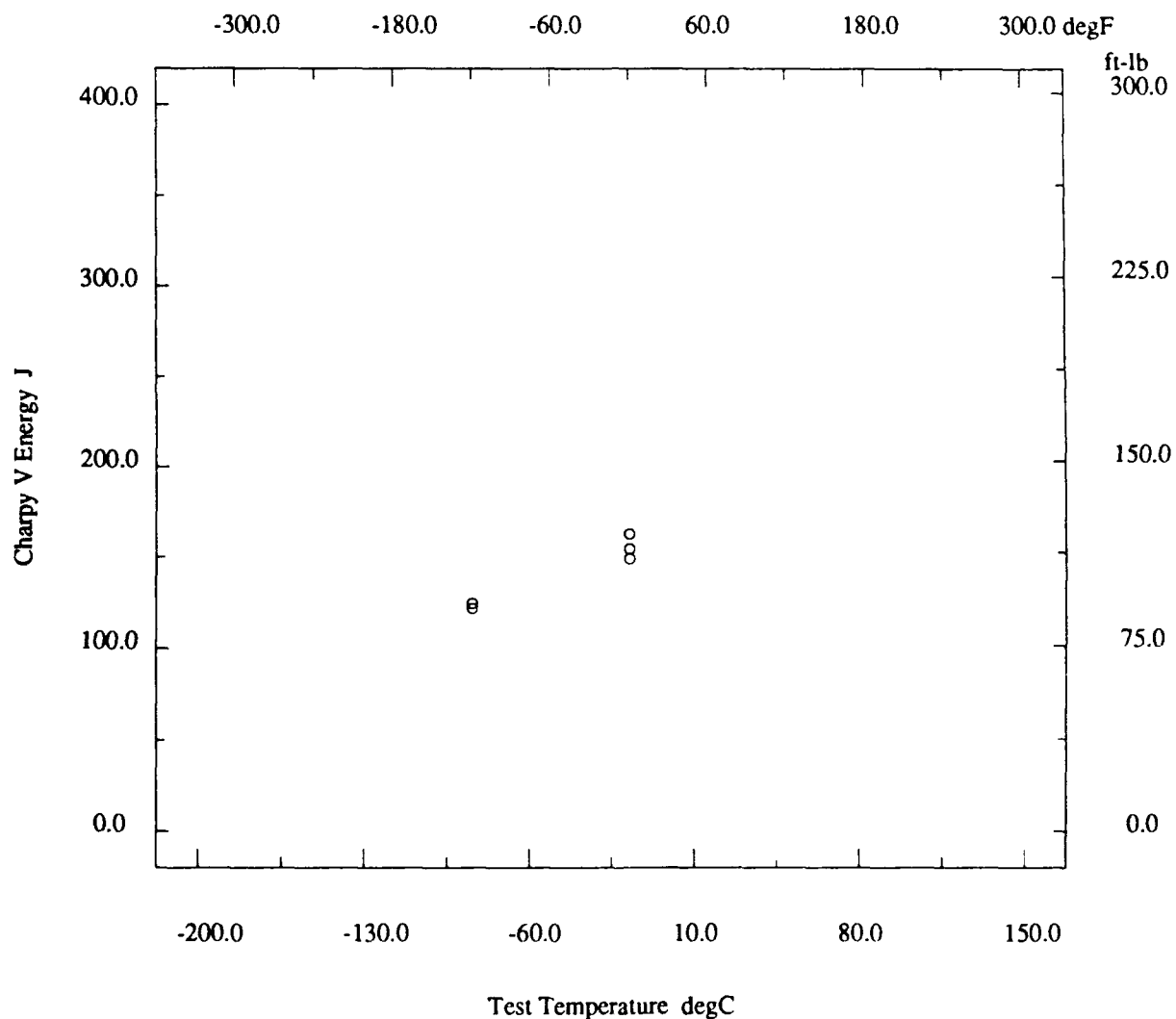
Material HY80

Page 17400.10

## Description

Material Code ..... 001.010.01T2  
 UNS ..... \*  
 Type ..... Wrought Metal  
 Thickness ..... 3.25 in  
 Composition Position ..... Ladle  
 Reference ..... USN-1

Material Name ..... HY80  
 Other Designation ..... \*  
 Form ..... Plate  
 Composition Type ..... Actual  
 Lot ID ..... D2580-4



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.11

<b>Description</b>	
Material Code .....	001.010.01M1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	3.25 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D2580-4
Reference .....	USN-1
<b>Composition</b>	
See Page 17400.1	
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Producer .....	*
Year Produced .....	1981
Addl Info .....	No
Source .....	*
Melting Practice .....	*
Ingot Position .....	Mid
Killing Process .....	*
Process Temperature .....	1660 degF
Process Time .....	3.25 hr
Rolling Conditions .....	90 %
Final Processing .....	A,Q,T
Final Temperature .....	1220 degF
Final Time .....	3.25 hr
Cold Work Strain .....	*
Aging Temperature .....	*
Aging Time .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Position .....	1/4T
Specimen Type .....	*
Specimen Thickness .....	*
Gage Length .....	*
Loading Rate .....	*
Tensile Strength Offset .....	*
Uniform Elongation .....	*
Tensile Modulus .....	*
Standard Method .....	*
Standard Year .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.0	85.5	*	24	68.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.12

<b>Description</b>			
Material Code	001.010.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		
<b>Composition</b>		See Page 17400.1	
<b>Fabrication History</b>		See Page 17400.11	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	74
T-L °	-120	79
T-L °	-120	84
T-L °	0	104
T-L °	0	104
T-L °	0	108

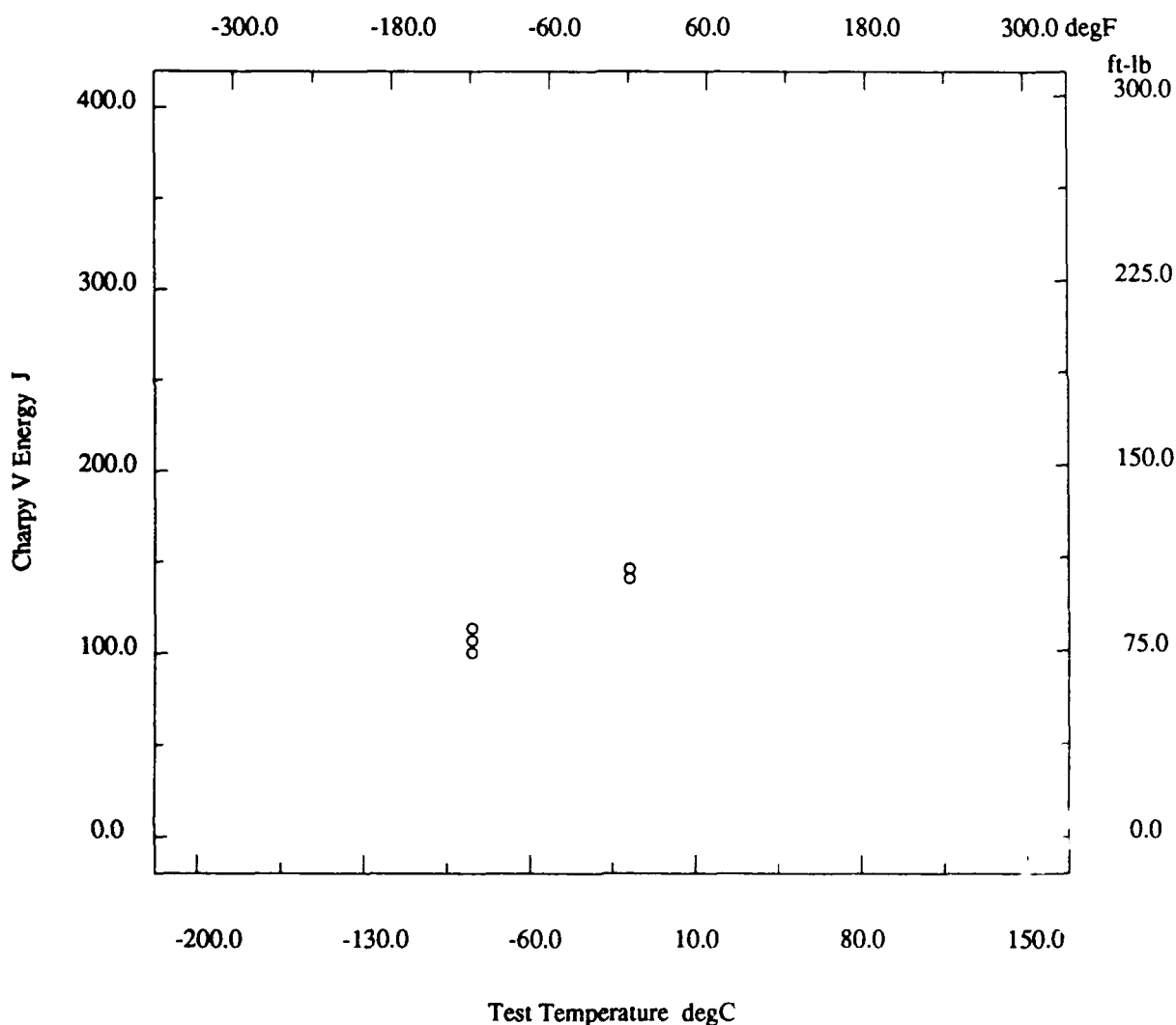


# Marine Structural Toughness Data Bank

Material HY80

Page 17400.13

Description			
Material Code	001.010.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.14

<b>Description</b>						
Material Code	001.010.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D2580-4			
Reference	USN-1					
<b>Composition</b>		See Page 17400.1				
<b>Fabrication History</b>		See Page 17400.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.5	88.2	*	24	68.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.15

<b>Description</b>		
Material Code	001.010.01MM	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.25 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D2580-4

<b>Composition</b>	See Page 17400.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17400.11
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	62
T-L °	-120	66
T-L °	-120	68
T-L °	0	80
T-L °	0	82
T-L °	0	86

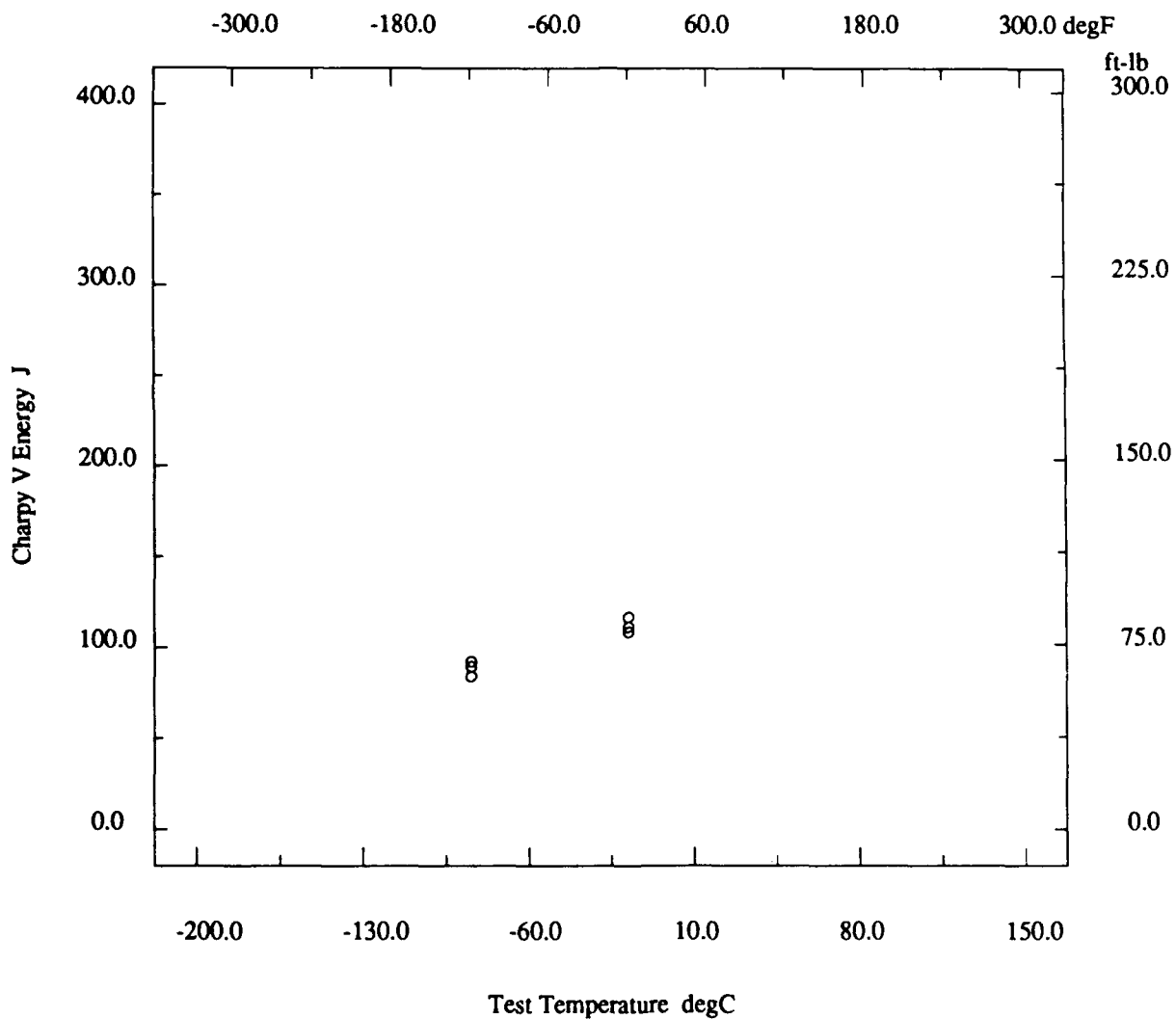
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.16

Description			
Material Code	001.010.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.17

<b>Description</b>						
Material Code	001.010.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D2580-4			
Reference	USN-1					
<b>Composition</b>		See Page 17400.1				
<b>Fabrication History</b>		See Page 17400.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	103.5	86.1	*	23	68.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.18

<b>Description</b>		
Material Code	001.010.01M2	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	3.25 in	Composition Type Actual
Composition Position	Ladle	Lot ID D2580-4
Reference	USN-1	
<b>Composition</b>		See Page 17400.1
<b>Fabrication History</b>		See Page 17400.11
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	69
T-L °	-120	73
T-L °	-120	74
T-L °	0	96
T-L °	0	96
T-L °	0	98

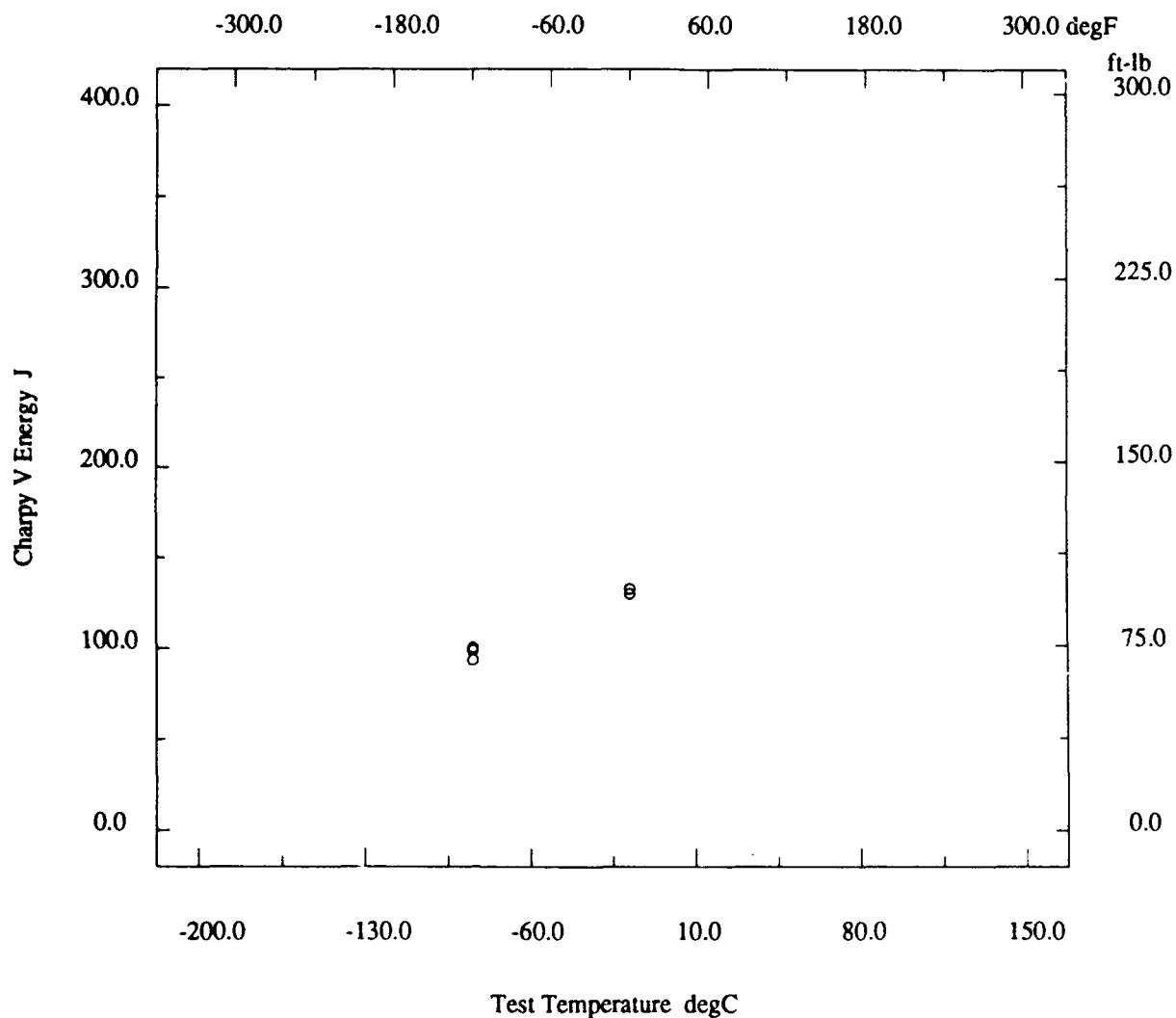
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.19

Description			
Material Code	001.010.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.20

<b>Description</b>						
Material Code	001.010.01B1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D2580-4			
Reference	USN-1					
<b>Composition</b>		See Page 17400.1				
<b>Fabrication History</b>						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1981	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Bottom	Killing Process	*			
Process Temperature	1660 degF	Process Time	3.25 hr			
Rolling Conditions	90 %	Final Processing	A,Q,T			
Final Temperature	1220 degF	Final Time	3.25 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	102.0	83.2	*	25	65.7

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17400.21

<b>Description</b>	
Material Code .....	001.010.01B1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	3.25 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D2580-4
Reference .....	USN-1
<b>Composition</b>	
See Page 17400.1	
<b>Fabrication History</b>	
See Page 17400.20	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ○	-120	73
T-L ○	-120	76
T-L ○	-120	80
T-L ○	0	102
T-L ○	0	120
T-L ○	0	124

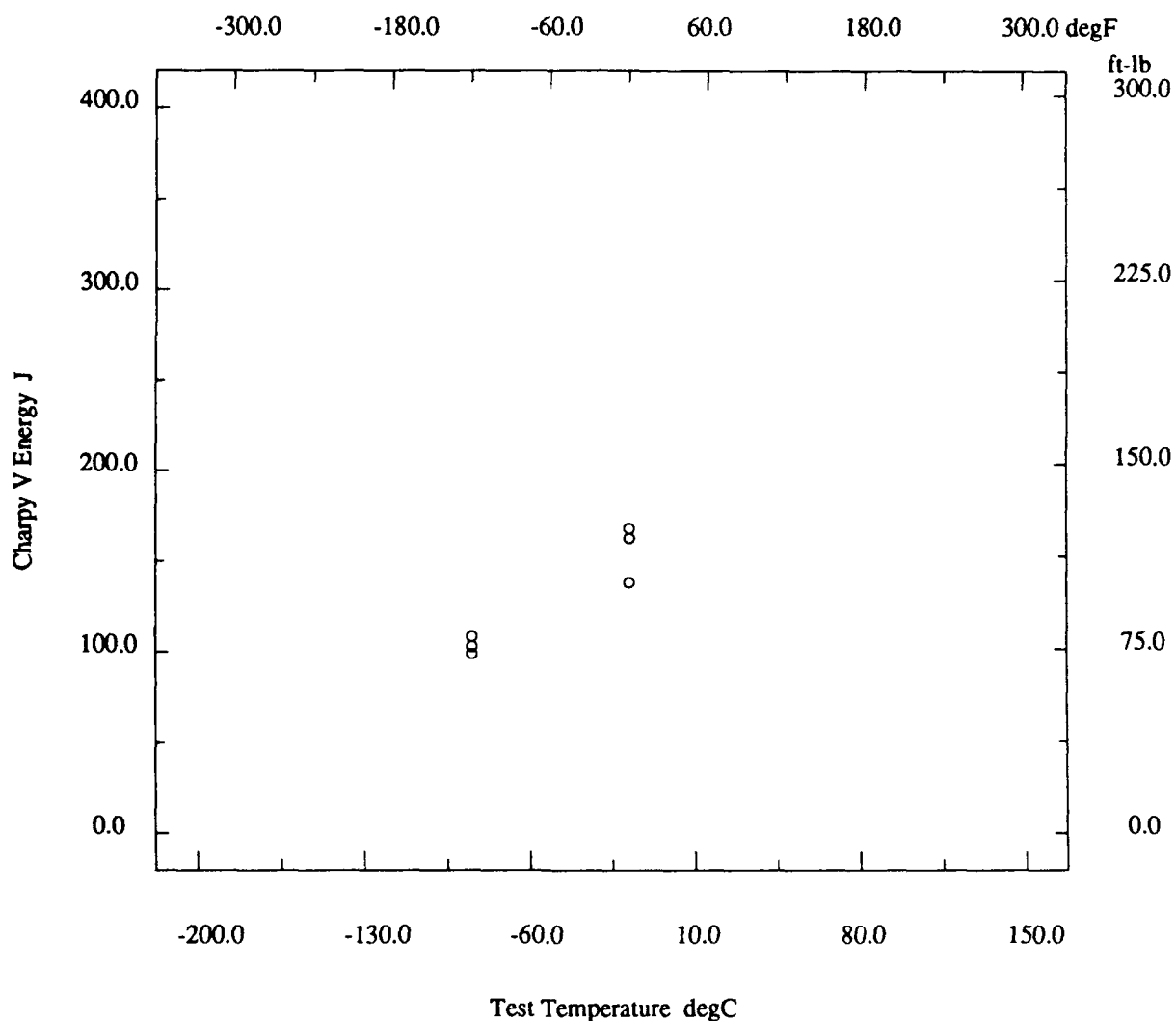
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.22

Description			
Material Code	001.010.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.23

Description							
Material Code	001.010.01BM	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	3.25 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	D2580-4				
Reference	USN-1						
Composition		See Page 17400.1					
Fabrication History		See Page 17400.20					
Property Measurements							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA	
	degF	ksi	ksi	ksi	%	%	
T	Room	102.5	84.8	*	24	72.0	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.24

<b>Description</b>	
Material Code .....	001.010.01BM
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	3.25 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D2580-4
Reference .....	USN-1
<b>Composition</b>	
See Page 17400.1	
<b>Fabrication History</b>	
See Page 17400.20	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

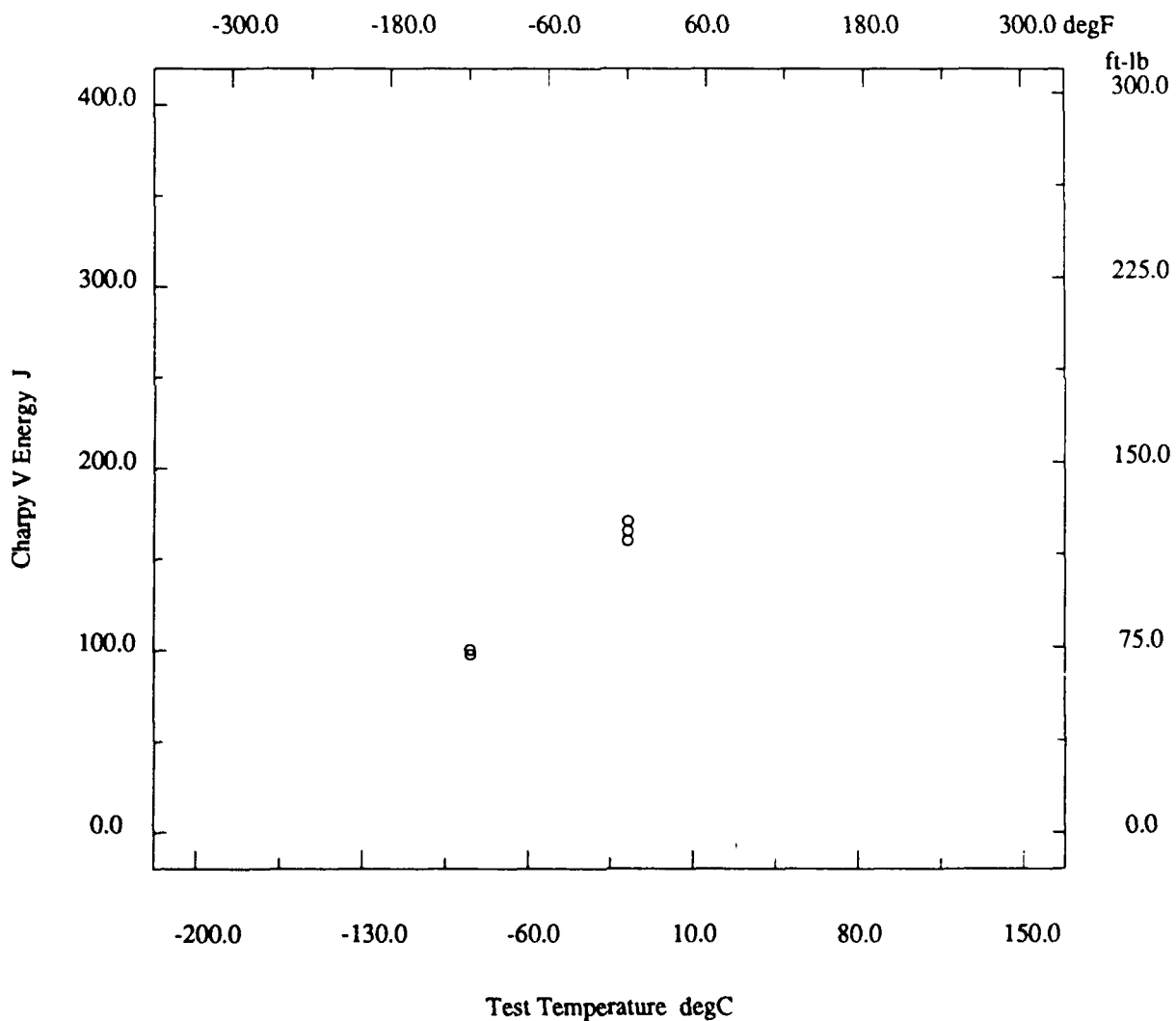
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	72
T-L ◦	-120	72
T-L ◦	-120	74
T-L ◦	0	118
T-L ◦	0	122
T-L ◦	0	126

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.25

Description					
Material Code	001.010.01BM	Material Name	HY80		
UNS	*	Other Designation	*		
Type	Wrought Metal	Form	Plate		
Thickness	3.25 in	Composition Type	Actual		
Composition Position	Ladle	Lot ID	D2580-4		
Reference	USN-1				



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.26

Description						
Material Code	001.010.01B2					
UNS	*					
Type	Wrought Metal					
Thickness	3.25 in					
Composition Position	Ladle					
Reference	USN-1					
Material Name		HY80				
Other Designation		*				
Form		Plate				
Composition Type		Actual				
Lot ID		D2580-4				
Composition		See Page 17400.1				
Fabrication History		See Page 17400.20				
Property Measurements						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	103.0	84.4	*	24	71.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.27

<b>Description</b>			
Material Code	001.010.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		
<b>Composition</b>		See Page 17400.1	
<b>Fabrication History</b>		See Page 17400.20	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	82
T-L °	-120	86
T-L °	-120	90
T-L °	0	120
T-L °	0	120
T-L °	0	120

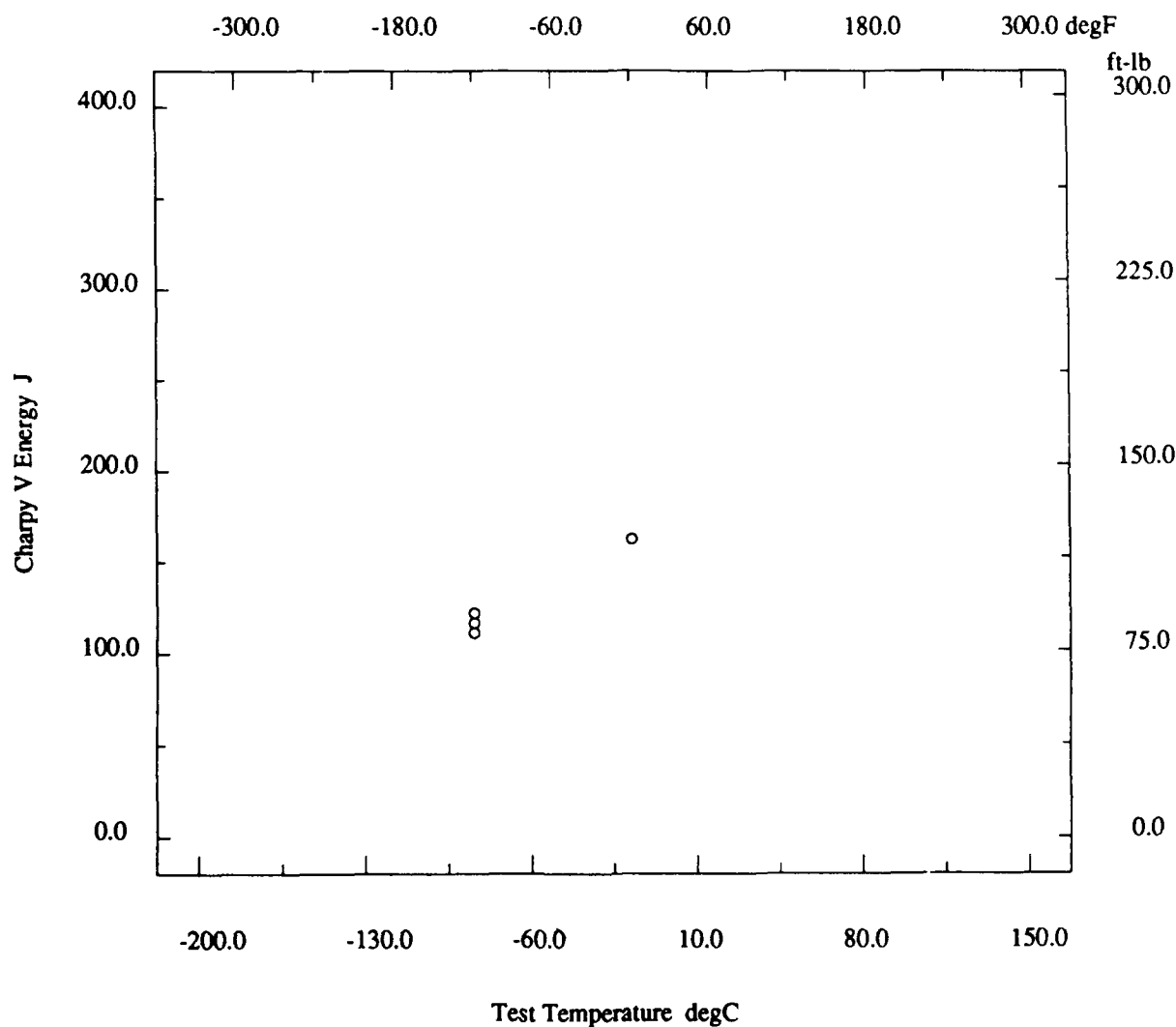
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17400.28

Description			
Material Code	001.010.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D2580-4
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17500.1

<b>Description</b>			
Material Code	001.011.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		
<b>Composition</b>			
C	0.15 %	Mn	0.34 %
P	0.013 %	S	0.01 %
Si	0.25 %	Cr	1.53 %
Ni	2.74 %	Mo	0.40 %
V	0.01 %	Cu	0.15 %
Cb	*	Ti	0.006 %
B	*	Al	0.038 %
N	*	Other Components	As=0.006; Sn=0.013; Sb=0.004 %
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Top	Killing Process	*
Process Temperature	1660 degF	Process Time	3 hr
Rolling Conditions	91 %	Final Processing	A,Q,T
Final Temperature	1220 degF	Final Time	3 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	111.4	96.2	*	21	68.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.2

<b>Description</b>			
Material Code	001.011.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		
<b>Composition</b>		See Page 17500.1	
<b>Fabrication History</b>		See Page 17500.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	90
L-T °	-120	94
L-T °	-120	94
L-T °	-120	97
L-T °	-120	98
L-T °	-40	104
L-T °	-40	104
L-T °	-40	104
L-T °	-40	106
L-T °	-40	110
L-T °	0	108
L-T °	0	111
L-T °	0	111
L-T °	0	114
L-T °	0	115
L-T °	32	121
L-T °	32	122
L-T °	32	123
L-T °	32	124
L-T °	32	131
L-T °	70	126
L-T °	70	128
L-T °	70	128
L-T °	70	128
L-T °	70	135
T-L △	-120	84
T-L △	-120	85
T-L △	-120	87
T-L △	-120	87
T-L △	-120	89
T-L △	-40	102
T-L △	-40	103
T-L △	-40	104

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L ^	-40	108
T-L ^	-40	98
T-L ^	0	105
T-L ^	0	109
T-L ^	0	109
T-L ^	0	109
T-L ^	0	109
T-L ^	32	104
T-L ^	32	111
T-L ^	32	98
T-L ^	32	99
T-L ^	32	99
T-L ^	70	102
T-L ^	70	98
T-L ^	70	98
T-L ^	70	99
T-L ^	70	99

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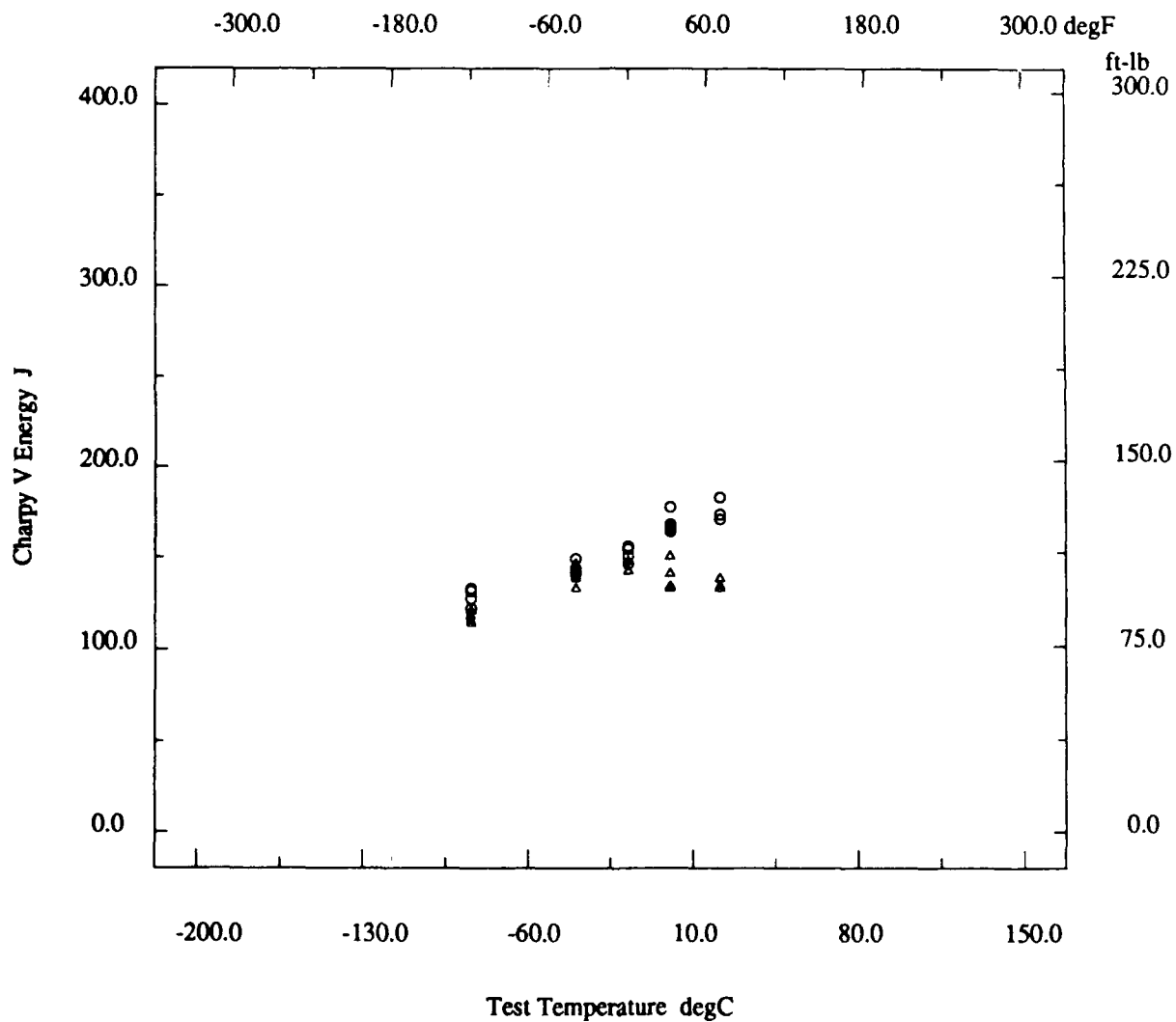
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# Marine Structural Toughness Data Bank

Material HY80

Page 17500.4

Description			
Material Code	001.011.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.5

<b>Description</b>						
Material Code	001.011.01TM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8490-2			
Reference	USN-1					
<b>Composition</b>		See Page 17500.1				
<b>Fabrication History</b>		See Page 17500.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	112.5	98.7	*	22	69.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.6

<b>Description</b>	
Material Code .....	001.011.01TM
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	3 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	B8490-2
Reference .....	USN-1
<b>Composition</b>	
See Page 17500.1	
<b>Fabrication History</b>	
See Page 17500.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	69
T-L °	-120	70
T-L °	-120	76
T-L °	0	95
T-L °	0	98
T-L °	0	99

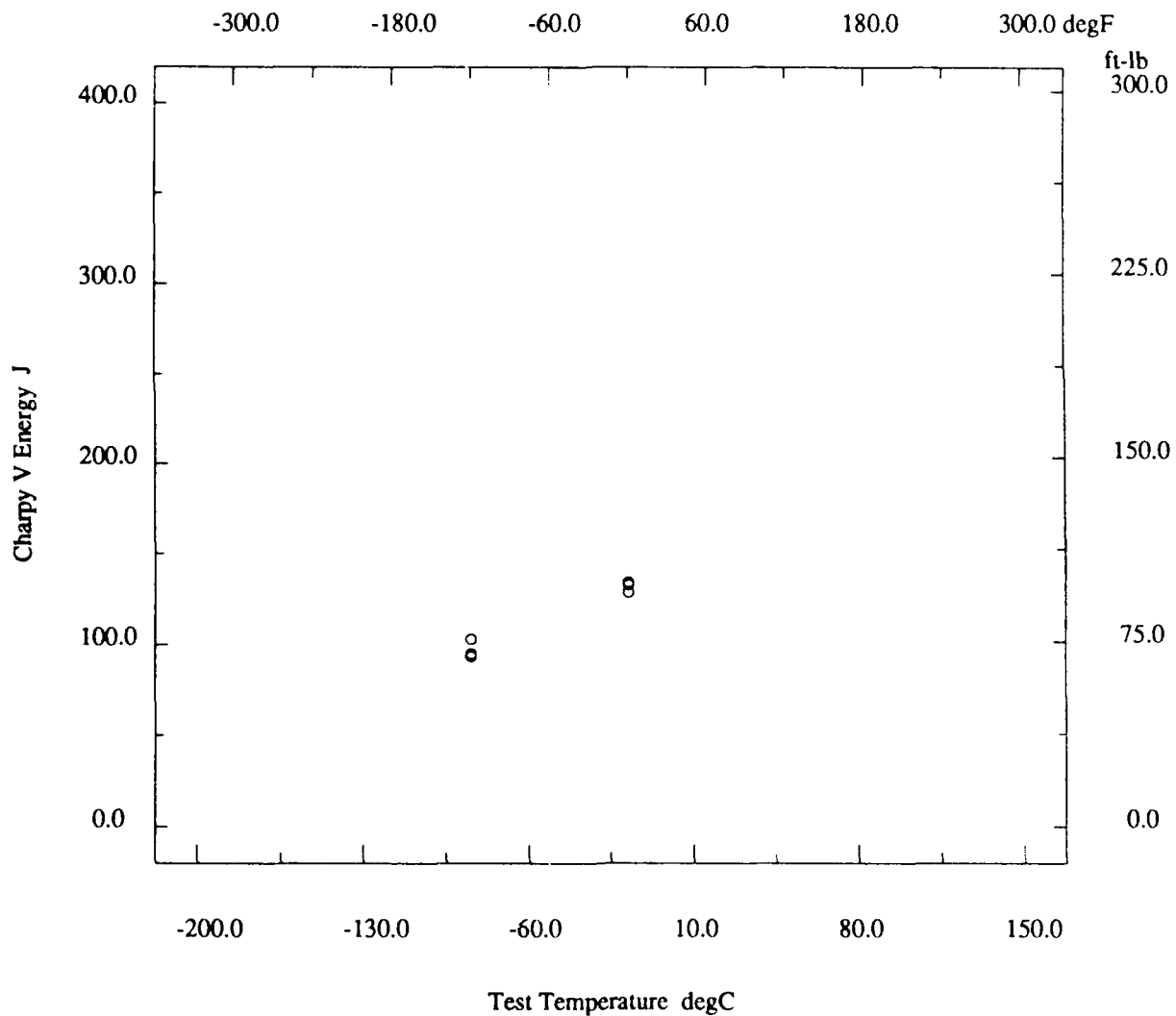
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.7

Description			
Material Code	001.011.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.8

<b>Description</b>						
Material Code	001.011.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8490-2			
Reference	USN-1					
<b>Composition</b>		See Page 17500.1				
<b>Fabrication History</b>		See Page 17500.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	113.4	99.4	*	22	62.0

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17500.9

<b>Description</b>		
Material Code	001.011.01T2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8490-2

**Composition**

See Page 17500.1

**Fabrication History**

See Page 17500.1

**Property Measurements**

Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	73
T-L °	-120	74
T-L °	-120	74
T-L °	0	89
T-L °	0	91
T-L °	0	92

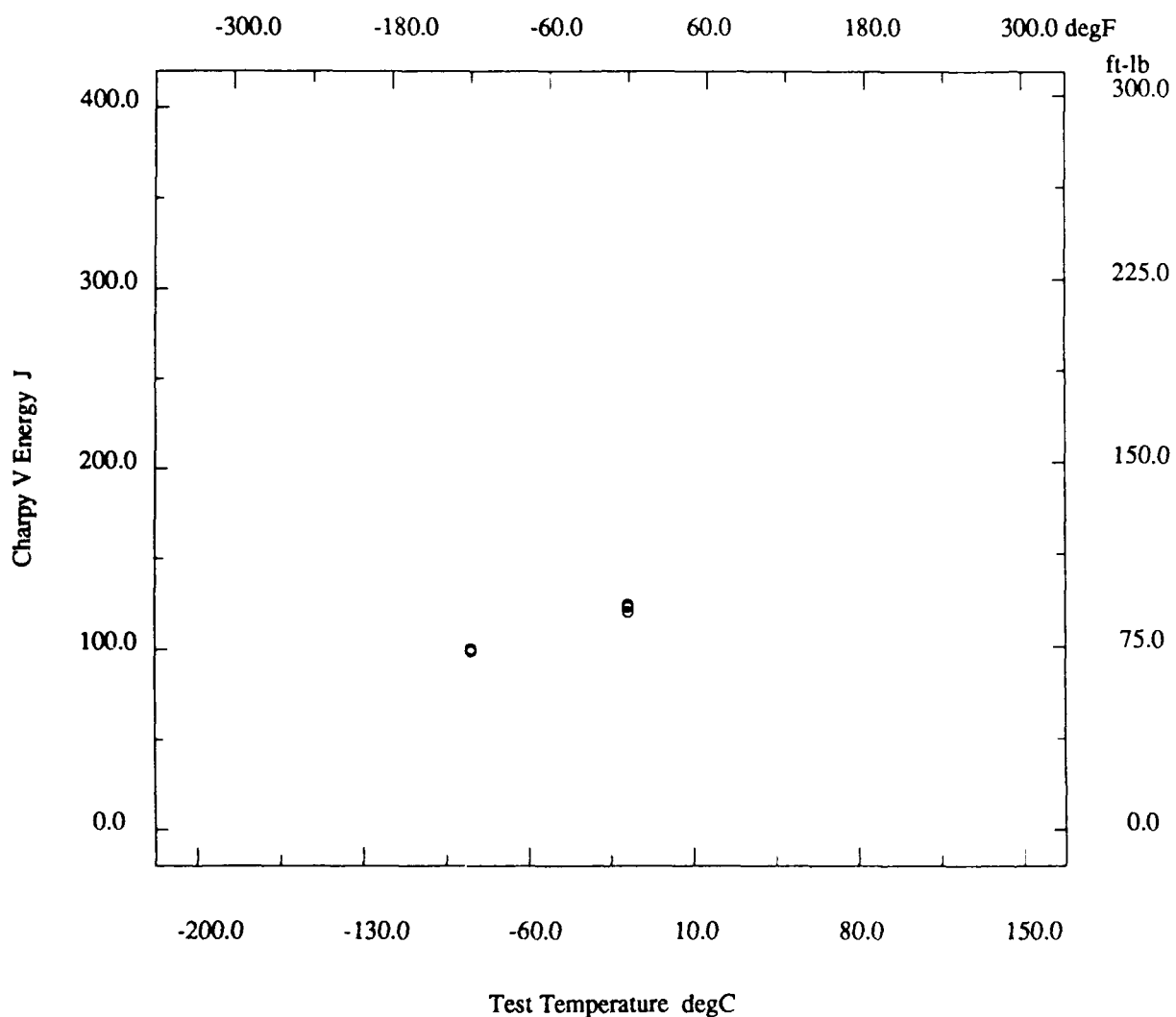
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.10

Description			
Material Code	001.011.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.11

<b>Description</b>						
Material Code	001.011.01B1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8490-2			
Reference	USN-1					
<b>Composition</b>		See Page 17500.1				
<b>Fabrication History</b>						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Bottom	Killing Process	*			
Process Temperature	1660 degF	Process Time	3 hr			
Rolling Conditions	91 %	Final Processing	A,Q,T			
Final Temperature	1220 degF	Final Time	3 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	109.6	93.8	*	21	67.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.12

<b>Description</b>		
Material Code	001.011.01B1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8490-2
<b>Composition</b>		See Page 17500.1
<b>Fabrication History</b>		See Page 17500.11
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	50
T-L °	-120	62
T-L °	-120	64
T-L °	0	103
T-L °	0	111
T-L °	0	118

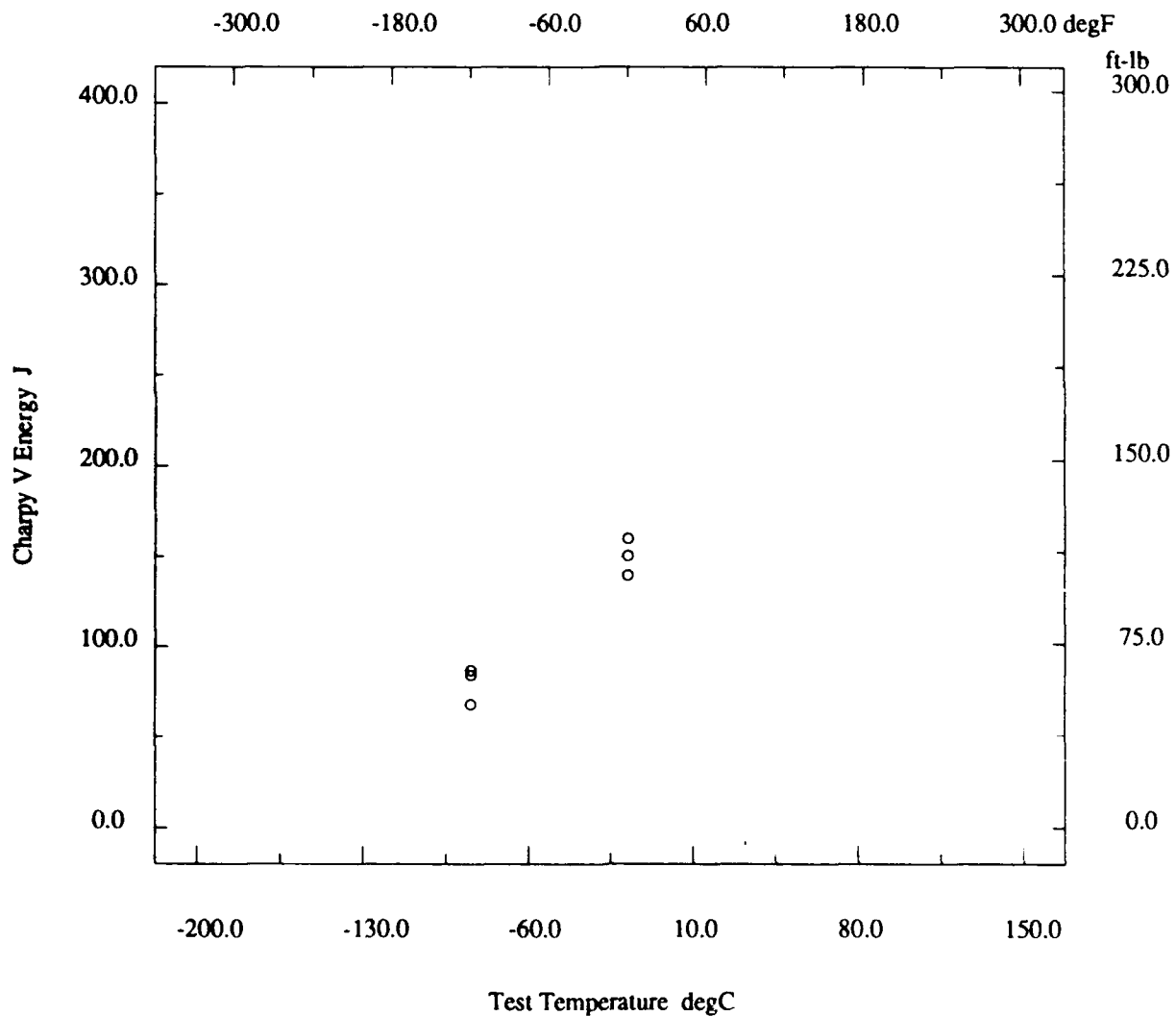
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.13

Description			
Material Code	001.011.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.14

<b>Description</b>						
Material Code	001.011.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8490-2			
Reference	USN-1					
<b>Composition</b>		See Page 17500.1				
<b>Fabrication History</b>		See Page 17500.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	109.0	94.3	*	23	69.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.15

<b>Description</b>	
Material Code	001.011.01BM
UNS	*
Type	Wrought Metal
Thickness	3 in
Composition Position	Ladle
Reference	USN-1
Material Name	HY80
Other Designation	*
Form	Plate
Composition Type	Actual
Lot ID	B8490-2

<b>Composition</b>	See Page 17500.1
<b>Fabrication History</b>	See Page 17500.11

<b>Property Measurements</b>	
Test Type	Charpy V Impact
Specimen Type	Full
Shear Fracture	*
Did Specimen Split?	*
Standard Year	*
Position	1/4T
Lateral Expansion	*
Did Specimen Fracture?	Assumed
Standard Method	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	73
T-L ◦	-120	87
T-L ◦	-120	87
T-L ◦	0	118
T-L ◦	0	123
T-L ◦	0	125

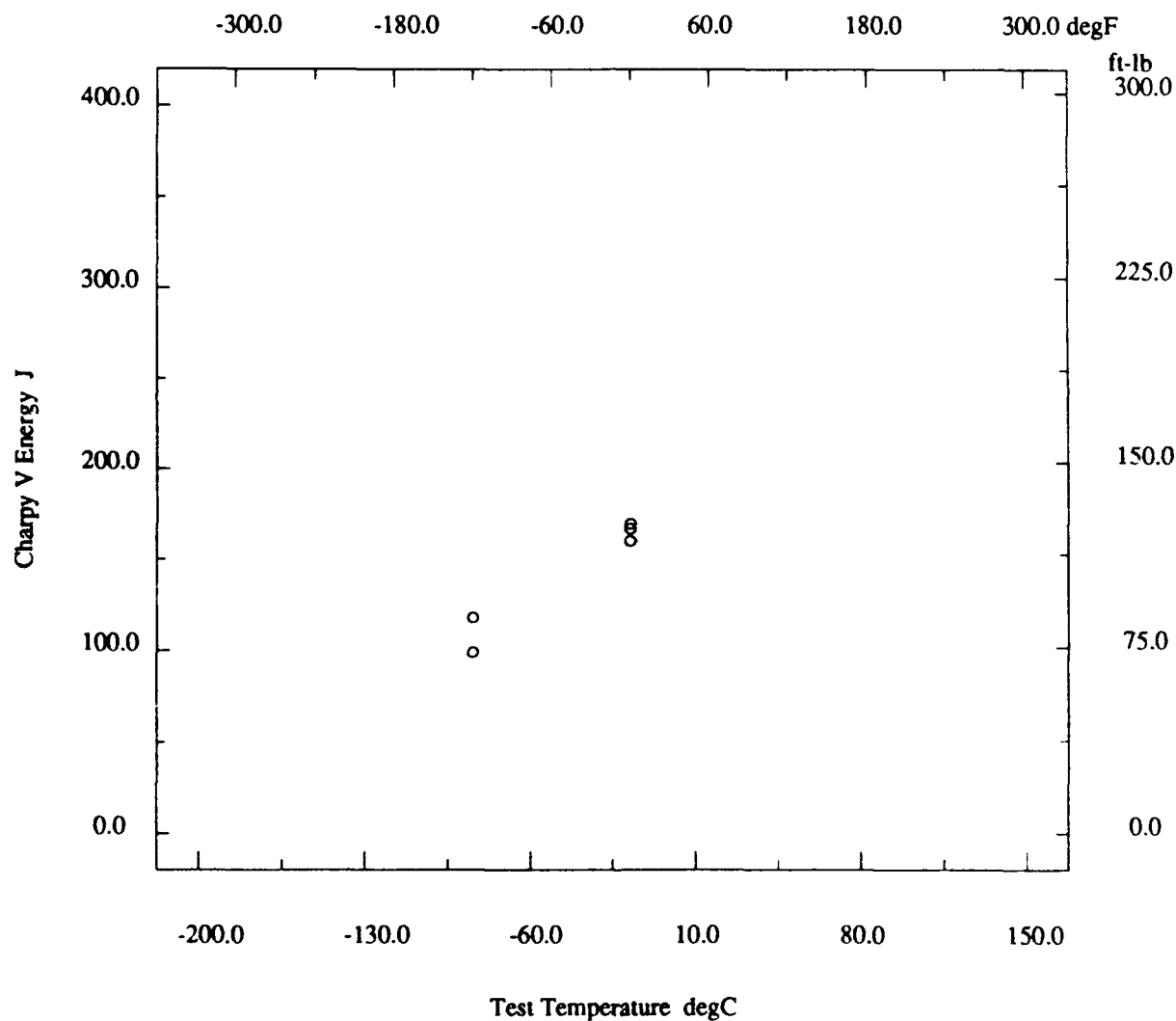
\* not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.16

Description			
Material Code	001.011.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17500.17

<b>Description</b>						
Material Code	001.011.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8490-2			
Reference	USN-1					
<b>Composition</b>		See Page 17500.1				
<b>Fabrication History</b>		See Page 17500.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	108.0	93.4	*	21	67.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.18

<b>Description</b>			
Material Code	001.011.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		
<b>Composition</b>		See Page 17500.1	
<b>Fabrication History</b>		See Page 17500.11	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-120	74
T-L ◯	-120	79
T-L ◯	-120	79
T-L ◯	0	105
T-L ◯	0	112
T-L ◯	0	115

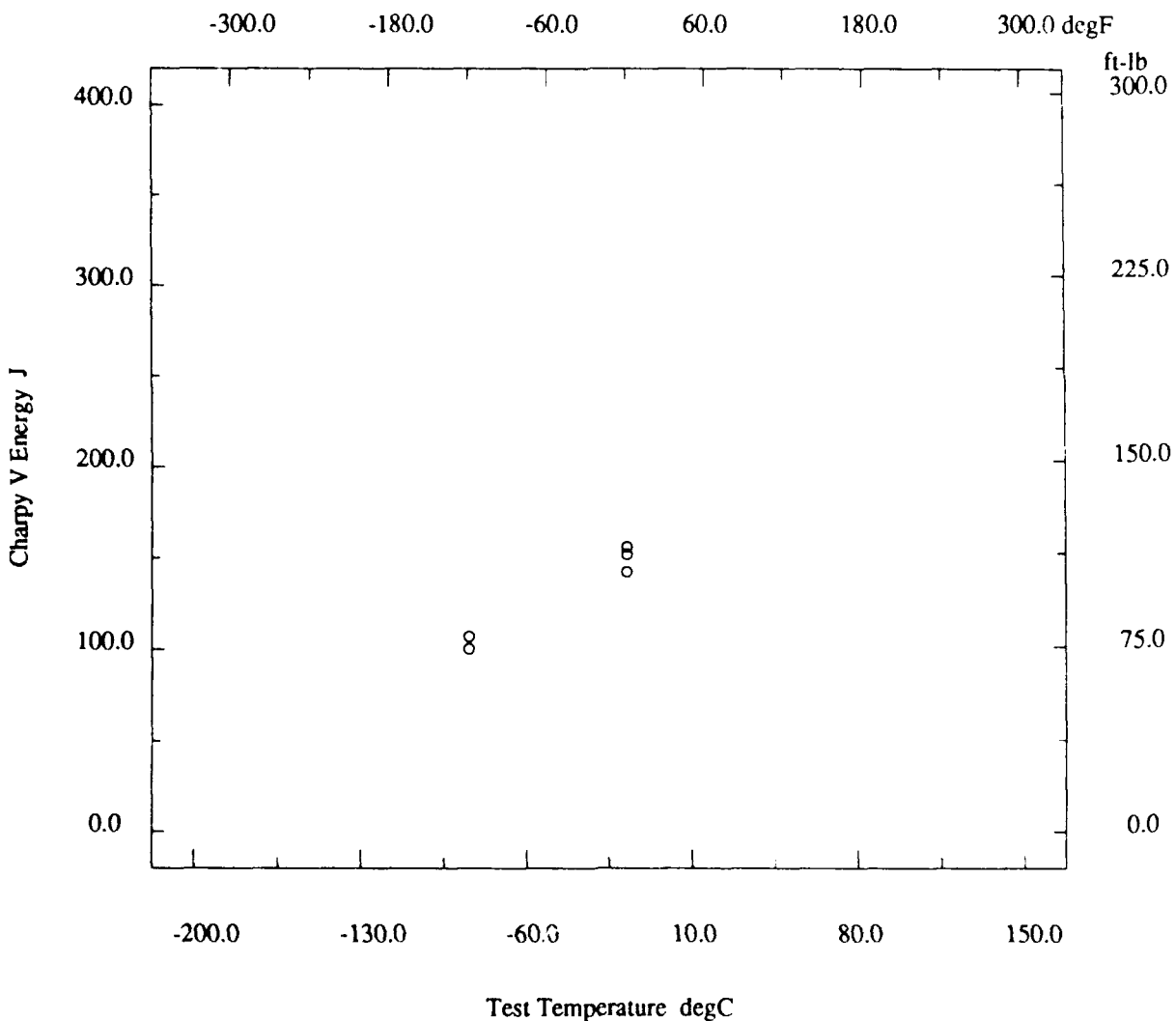
\* not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17500.19

Description			
Material Code	001.011.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8490-2
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17600.1

<b>Description</b>							
Material Code	001.012.01T1	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	2.5 in	Composition Type	Actual				
Composition Position	Ladie	Lot ID	B8687-1				
Reference	USN-1						
<b>Composition</b>							
C	0.17 %	Mn	0.28 %				
P	0.009 %	S	0.016 %				
Si	0.22 %	Cr	1.48 %				
Ni	2.69 %	Mo	0.39 %				
V	0.01 %	Cu	0.14 %				
Cb	*	Ti	0.003 %				
B	*	Al	0.033 %				
N	*	Other Components	As=0.009;Sn=0.012;Sb=0.005 %				
<b>Fabrication History</b>							
Heat Treatment	A,Q,T	Producer	*				
Year Produced	1982	Addl Info	No				
Source	*	Melting Practice	*				
Ingot Position	Top	Killing Process	*				
Process Temperature	1660 degF	Process Time	2.5 hr				
Rolling Conditions	89 %	Final Processing	A,Q,T				
Final Temperature	1260 degF	Final Time	2.5 hr				
Cold Work Strain	*	Aging Temperature	*				
Aging Time	*	Location	*				
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA	
	degF	ksi	ksi	ksi	%	%	
T	Room	106	89.3	*	24	71.3	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17600.2

<b>Description</b>			
Material Code	001.012.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8687-1
Reference	USN-1		
<b>Composition</b>		See Page 17600.1	
<b>Fabrication History</b>		See Page 17600.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	61
L-T °	-120	63
L-T °	-120	64
L-T °	-120	67
L-T °	-120	69
L-T °	-40	60
L-T °	-40	68
L-T °	-40	70
L-T °	-40	72
L-T °	-40	72
L-T °	0	60
L-T °	0	60
L-T °	0	60
L-T °	0	70
L-T °	0	78
L-T °	32	68
L-T °	32	70
L-T °	32	72
L-T °	32	82
L-T °	32	82
L-T °	70	64
L-T °	70	66
L-T °	70	72
L-T °	70	73
L-T °	70	78
T-L ▲	-120	54
T-L ▲	-120	56
T-L ▲	-120	56
T-L ▲	-120	56
T-L ▲	-120	60
T-L ▲	-40	68
T-L ▲	-40	68
T-L ▲	-40	68

(continued)

\* - not reported

## Marine Structural Toughness Data Bank

### Material HY80

Page 17600.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	70
T-L Δ	-40	76
T-L Δ	0	68
T-L Δ	0	70
T-L Δ	0	70
T-L Δ	0	72
T-L Δ	0	72
T-L Δ	32	66
T-L Δ	32	66
T-L Δ	32	78
T-L Δ	32	78
T-L Δ	32	78
T-L Δ	70	56
T-L Δ	70	66
T-L Δ	70	68
T-L Δ	70	72
T-L Δ	70	74

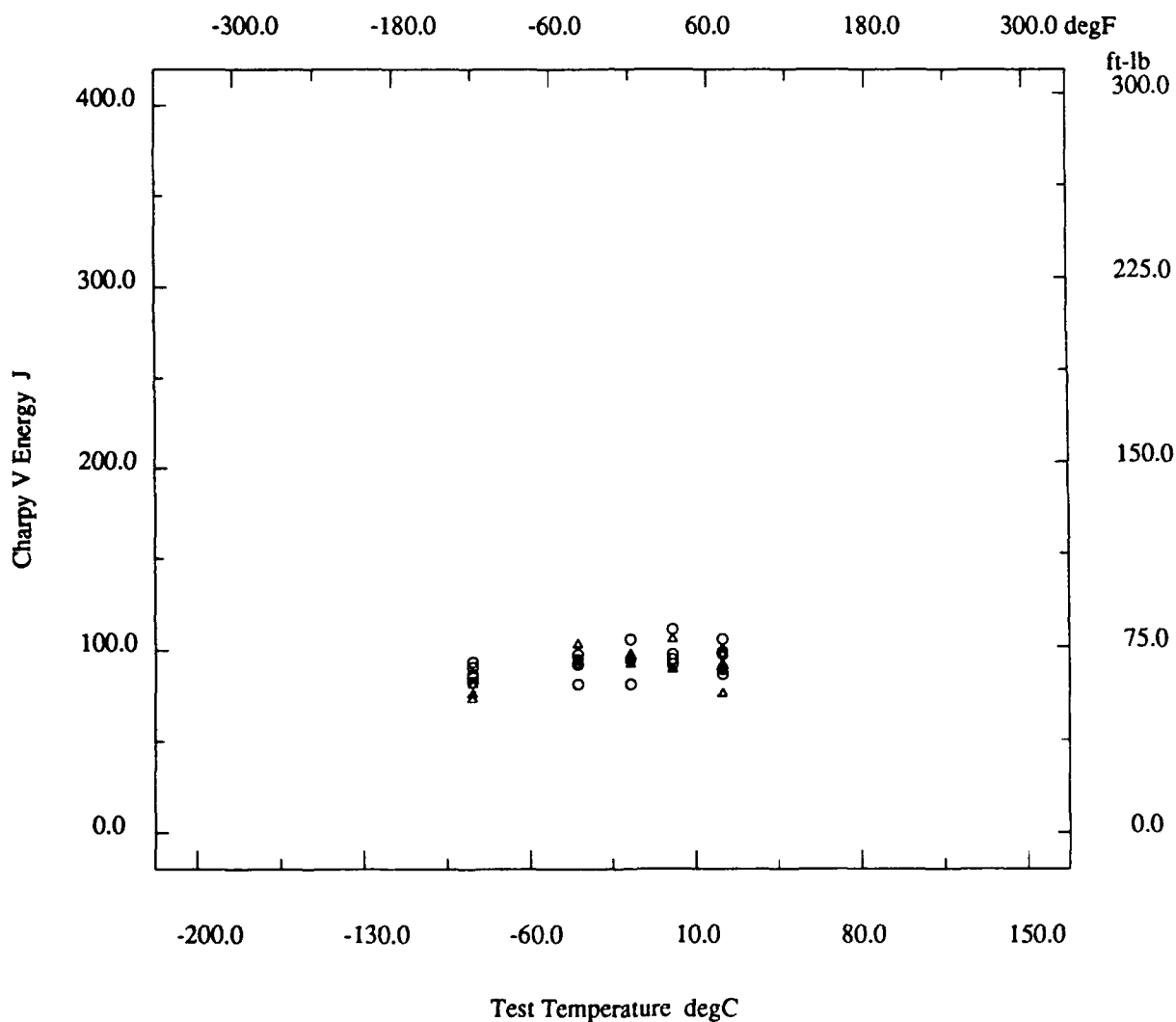
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17600.4

Description			
Material Code	001.012.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8687-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17600.5

<b>Description</b>			
Material Code	001.012.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8687-1
Reference	USN-1		
<b>Composition</b>		See Page 17600.1	
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Bottom	Killing Process	*
Process Temperature	1660 degF	Process Time	2.5 hr
Rolling Conditions	89 %	Final Processing	A,Q,T
Final Temperature	1260 degF	Final Time	2.5 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	104	86.7	*	25	70.5

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17600.6

<b>Description</b>		
Material Code	001.012.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.5 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8687-1
<b>Composition</b>		See Page 17600.1
<b>Fabrication History</b>		See Page 17600.5
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	50
T-L ◦	-120	50
T-L ◦	-120	54
T-L ◦	0	60
T-L ◦	0	60
T-L ◦	0	62

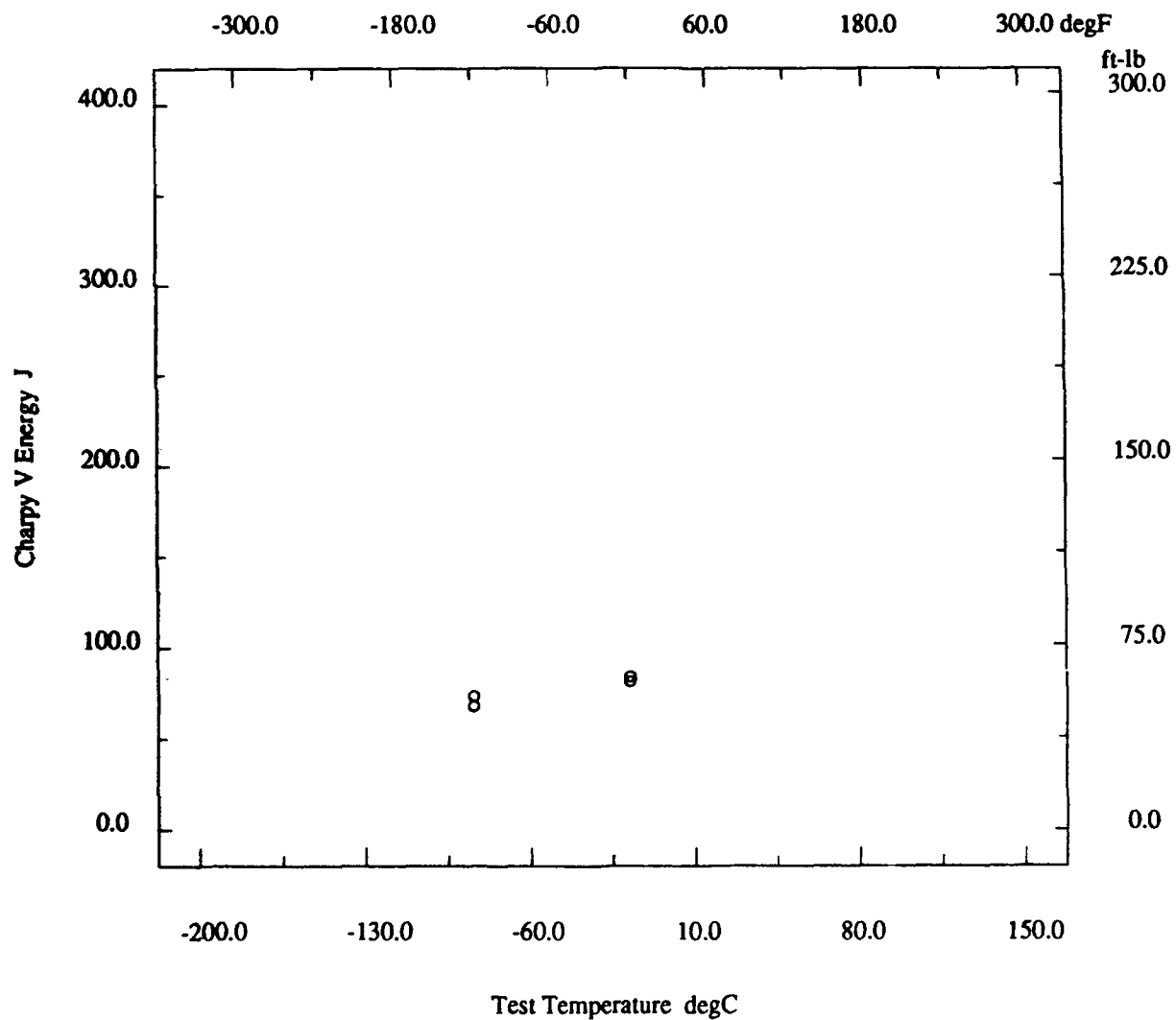
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17600.7

Description			
Material Code	001.012.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.5 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8687-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.1

<b>Description</b>							
Material Code	001.013.01T1	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	2.25 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	D3975-3E				
Reference	USN-1						
<b>Composition</b>							
C	0.15 %	Mn	0.33 %				
P	0.013 %	S	0.018 %				
Si	0.23 %	Cr	1.56 %				
Ni	2.82 %	Mo	0.40 %				
V	0.01 %	Cu	0.15 %				
Cb	*	Ti	0.003 %				
B	*	Al	0.026 %				
N	*	Other Components .As=0.008;Sn=0.014;Sb=0.007 %					
<b>Fabrication History</b>							
Heat Treatment	A,Q,T	Producer	*				
Year Produced	1982	Addl Info	No				
Source	*	Melting Practice	*				
Ingot Position	Top	Killing Process	*				
Process Temperature	1660 degF	Process Time	2.46 hr				
Rolling Conditions	75 %	Final Processing	A,Q,T				
Final Temperature	1280 degF	Final Time	2.25 hr				
Cold Work Strain	*	Aging Temperature	*				
Aging Time	*	Location	*				
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
<b>Orient</b>	<b>Test Temp</b>	<b>UTS</b>	<b>TYS</b>	<b>TYP</b>	<b>Elongation</b>	<b>RA</b>	
	degF	ksi	ksi	ksi	%	%	
T	Room	100.5	84.4	*	24	68.5	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.2

<b>Description</b>	
Material Code . . . . . 001.013.01T1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 2.25 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . D3975-3E
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 17700.1	
<b>Fabrication History</b> . . . . . See Page 17700.1	
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	108
L-T °	-120	110
L-T °	-120	112
L-T °	-120	112
L-T °	-120	118
L-T °	-40	112
L-T °	-40	114
L-T °	-40	116
L-T °	-40	118
L-T °	-40	122
L-T °	0	116
L-T °	0	120
L-T °	0	120
L-T °	0	120
L-T °	0	122
L-T °	32	120
L-T °	32	124
L-T °	32	124
L-T °	32	124
L-T °	32	126
L-T °	70	116
L-T °	70	118
L-T °	70	118
L-T °	70	120
L-T °	70	122
T-L Δ	-120	50
T-L Δ	-120	54
T-L Δ	-120	60
T-L Δ	-120	62
T-L Δ	-120	64
T-L Δ	-40	58
T-L Δ	-40	58
T-L Δ	-40	60

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

## Material HY80

Page 17700.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L ▲	-40	62
T-L ▲	-40	68
T-L ▲	0	60
T-L ▲	0	62
T-L ▲	0	64
T-L ▲	0	66
T-L ▲	0	68
T-L ▲	32	58
T-L ▲	32	60
T-L ▲	32	62
T-L ▲	32	68
T-L ▲	32	70
T-L ▲	70	62
T-L ▲	70	62
T-L ▲	70	62
T-L ▲	70	68
T-L ▲	70	68

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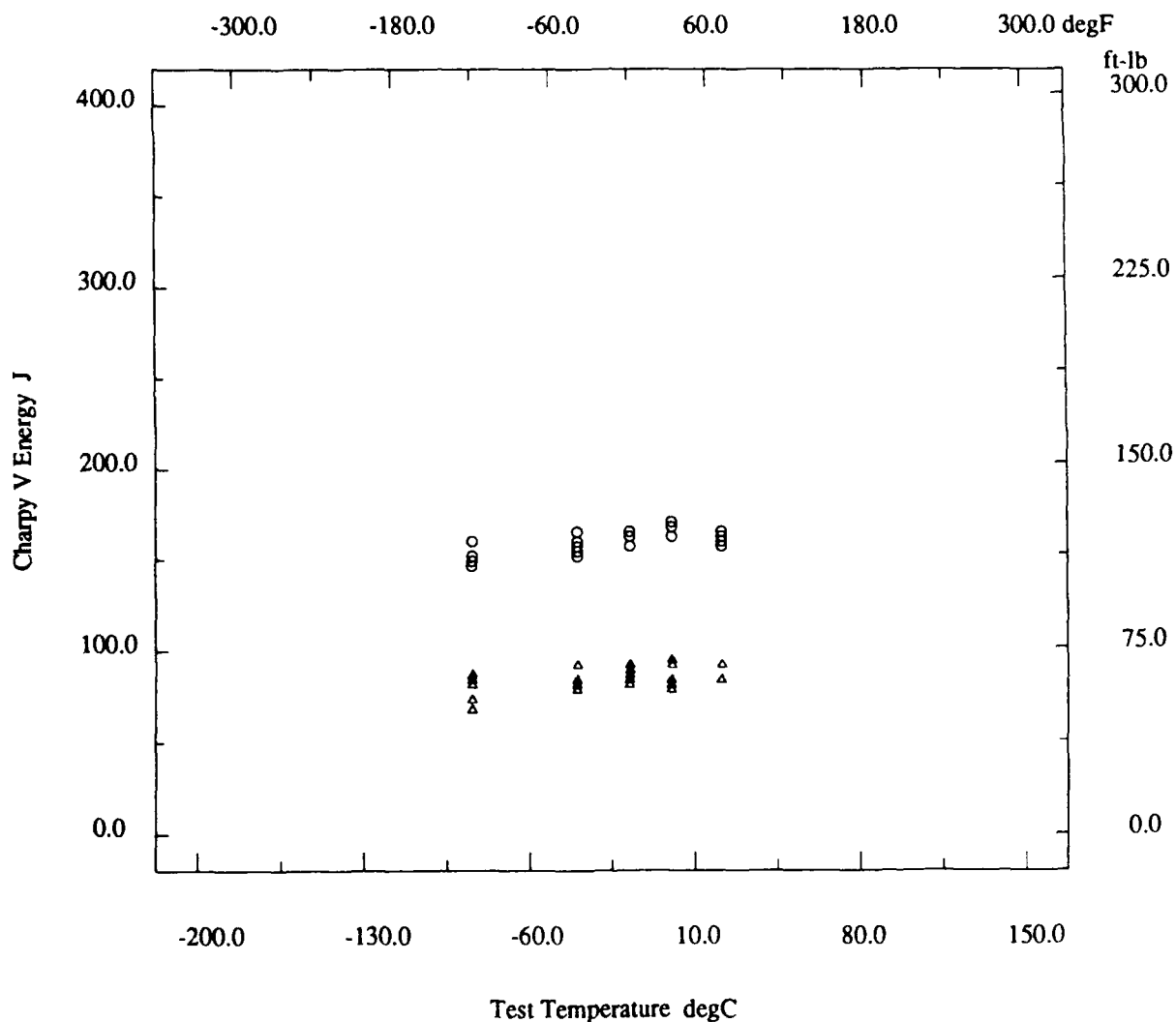
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.4

<b>Description</b>			
Material Code	001.013.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.5

<b>Description</b>						
Material Code	001.013.01TM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3975-3E			
Reference	USN-1					
<b>Composition</b>		See Page 17700.1				
<b>Fabrication History</b>		See Page 17700.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	106.0	90.1	*	22	64.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.6

<b>Description</b>	
Material Code	001.013.01TM
UNS	*
Type	Wrought Metal
Thickness	2.25 in
Composition Position	Ladle
Reference	USN-1
Material Name	HY80
Other Designation	*
Form	Plate
Composition Type	Actual
Lot ID	D3975-3E

<b>Composition</b>	See Page 17700.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17700.1
----------------------------	------------------

<b>Property Measurements</b>	
Test Type	Charpy V Impact
Specimen Type	Full
Shear Fracture	*
Did Specimen Split?	*
Standard Year	*
Position	1/4T
Lateral Expansion	*
Did Specimen Fracture?	Assumed
Standard Method	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	56
T-L °	-120	60
T-L °	-120	60
T-L °	0	62
T-L °	0	62
T-L °	0	64

\* - not reported

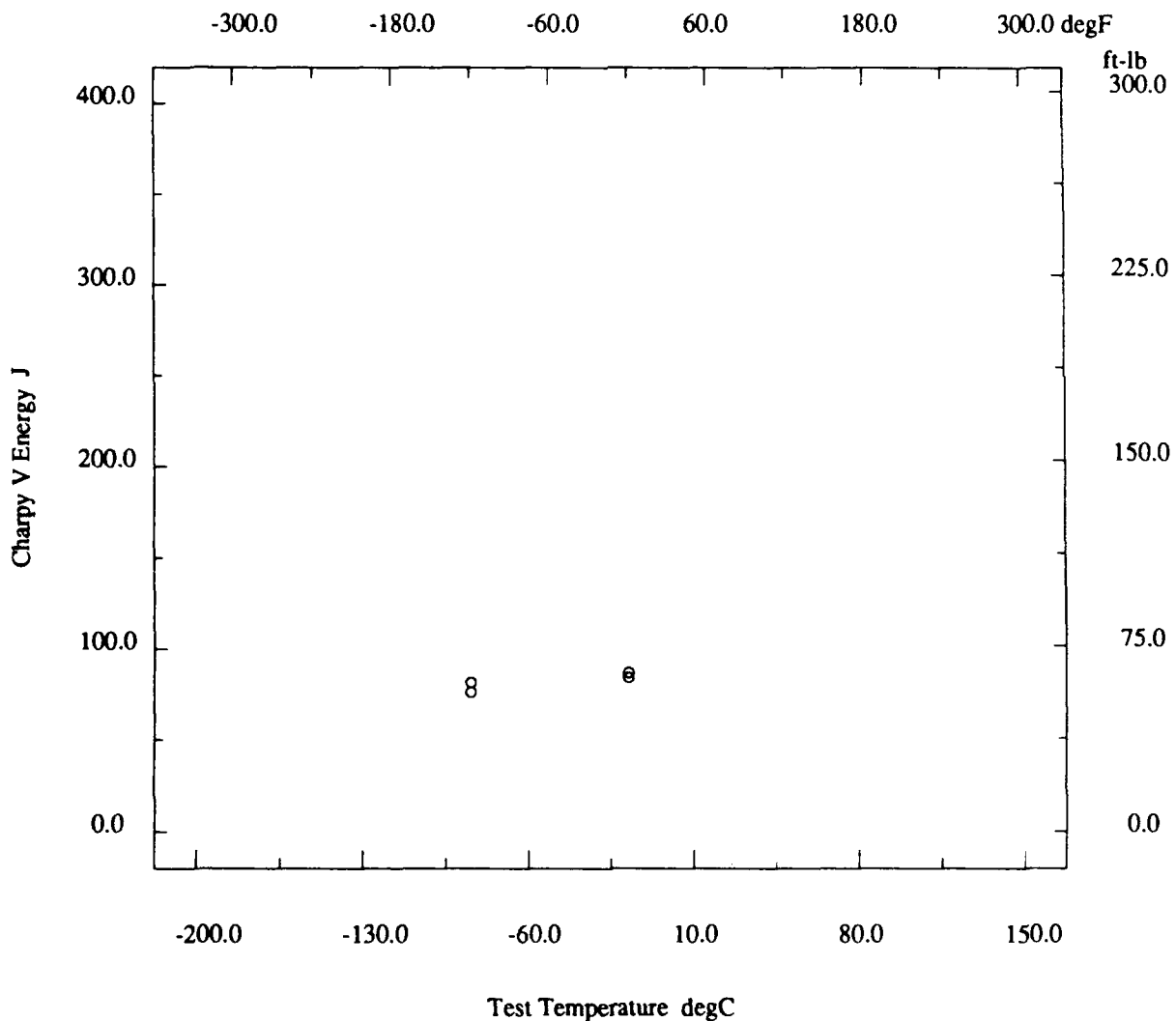


# Marine Structural Toughness Data Bank

Material HY80

Page 17700.7

Description			
Material Code	001.013.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.8

<b>Description</b>						
Material Code	001.013.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3975-3E			
Reference	USN-1					
<b>Composition</b>		See Page 17700.1				
<b>Fabrication History</b>		See Page 17700.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.7	89.9	*	23	63.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.9

<b>Description</b>	
Material Code . . . . . 001.013.01T2	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 2.25 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . D3975-3E
Reference . . . . . USN-1	
<b>Composition</b>	
See Page 17700.1	
<b>Fabrication History</b>	
See Page 17700.1	
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	54
T-L ◦	-120	56
T-L ◦	-120	61
T-L ◦	0	68
T-L ◦	0	70
T-L ◦	0	78

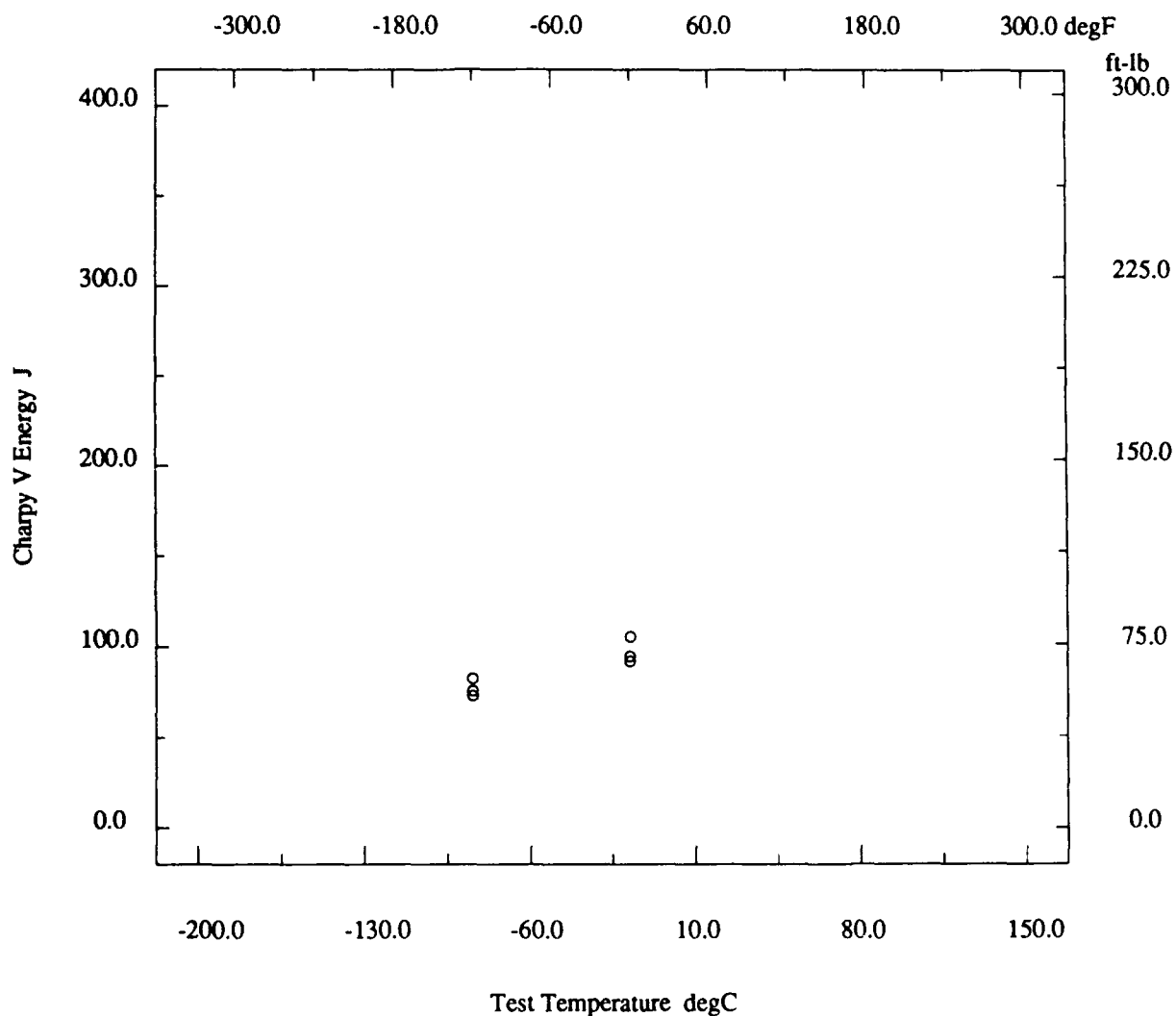
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.

Description			
Material Code	001.013.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.11

<b>Description</b>			
Material Code	001.013.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		
<b>Composition</b>		See Page 17700.1	
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Mid	Killing Process	*
Process Temperature	1660 degF	Process Time	2.46 hr
Rolling Conditions	75 %	Final Processing	A,Q,T
Final Temperature	1280 degF	Final Time	2.25 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		
Orient	Test Temp degF	UTS ksi	TYS ksi
		TYP ksi	Elongation %
T	Room	101.5	87.8
		*	23
			66.7

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.12

<b>Description</b>		
Material Code	001.013.01M1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	2.25 in	Composition Type Actual
Composition Position	Ladle	Lot ID D3975-3E
Reference	USN-1	
<b>Composition</b>		See Page 17700.1
<b>Fabrication History</b>		See Page 17700.11
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	49
T-L ◦	-120	50
T-L ◦	-120	53
T-L ◦	0	72
T-L ◦	0	80
T-L ◦	0	88

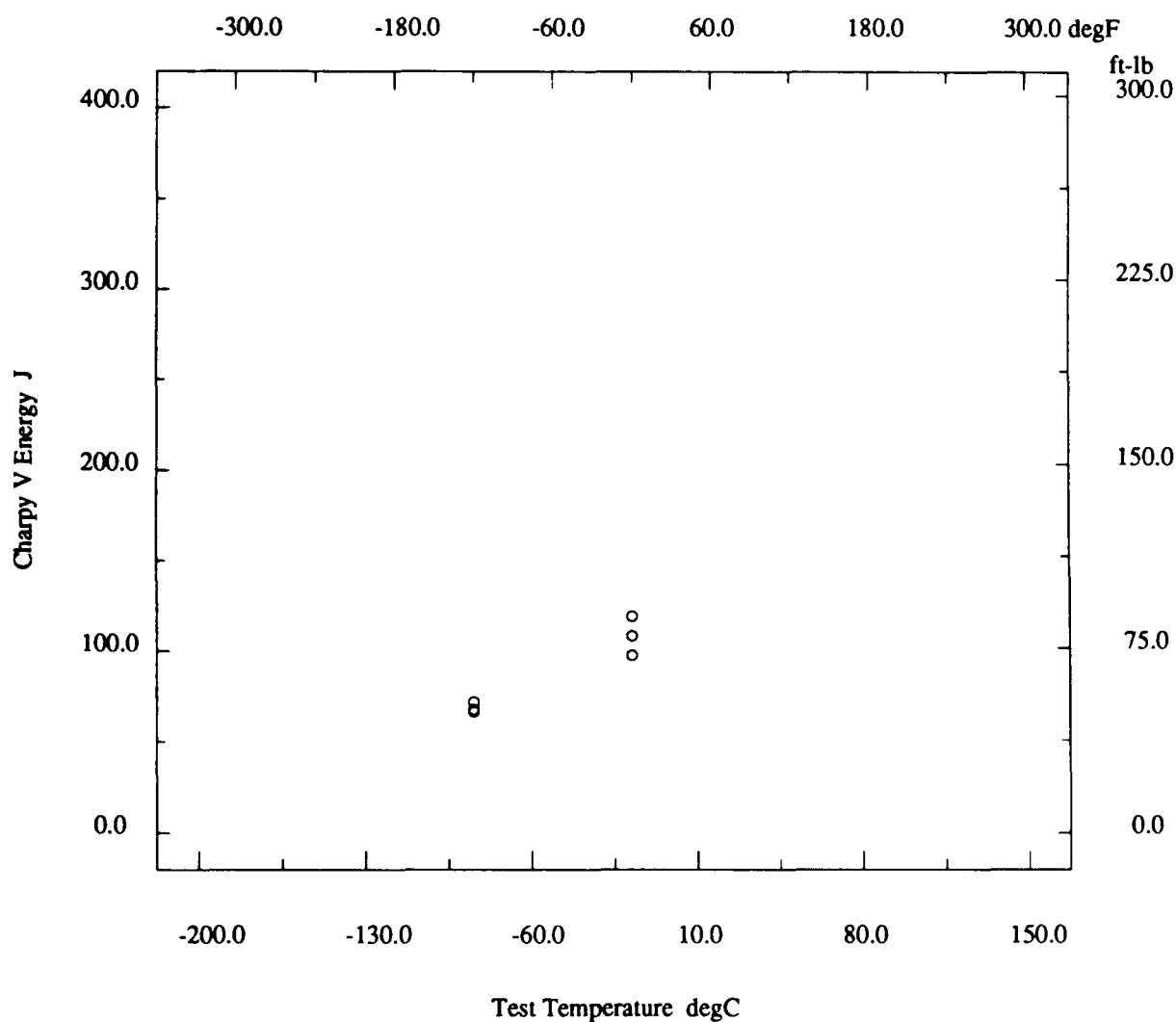
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.13

Description			
Material Code	001.013.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.14

<b>Description</b>						
Material Code	001.013.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3975-3E			
Reference	USN-1					
<b>Composition</b>		See Page 17700.1				
<b>Fabrication History</b>		See Page 17700.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	108.5	93.7	*	23	64.4

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17700.15

<b>Description</b>			
Material Code	001.013.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		

<b>Composition</b>	See Page 17700.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17700.11
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

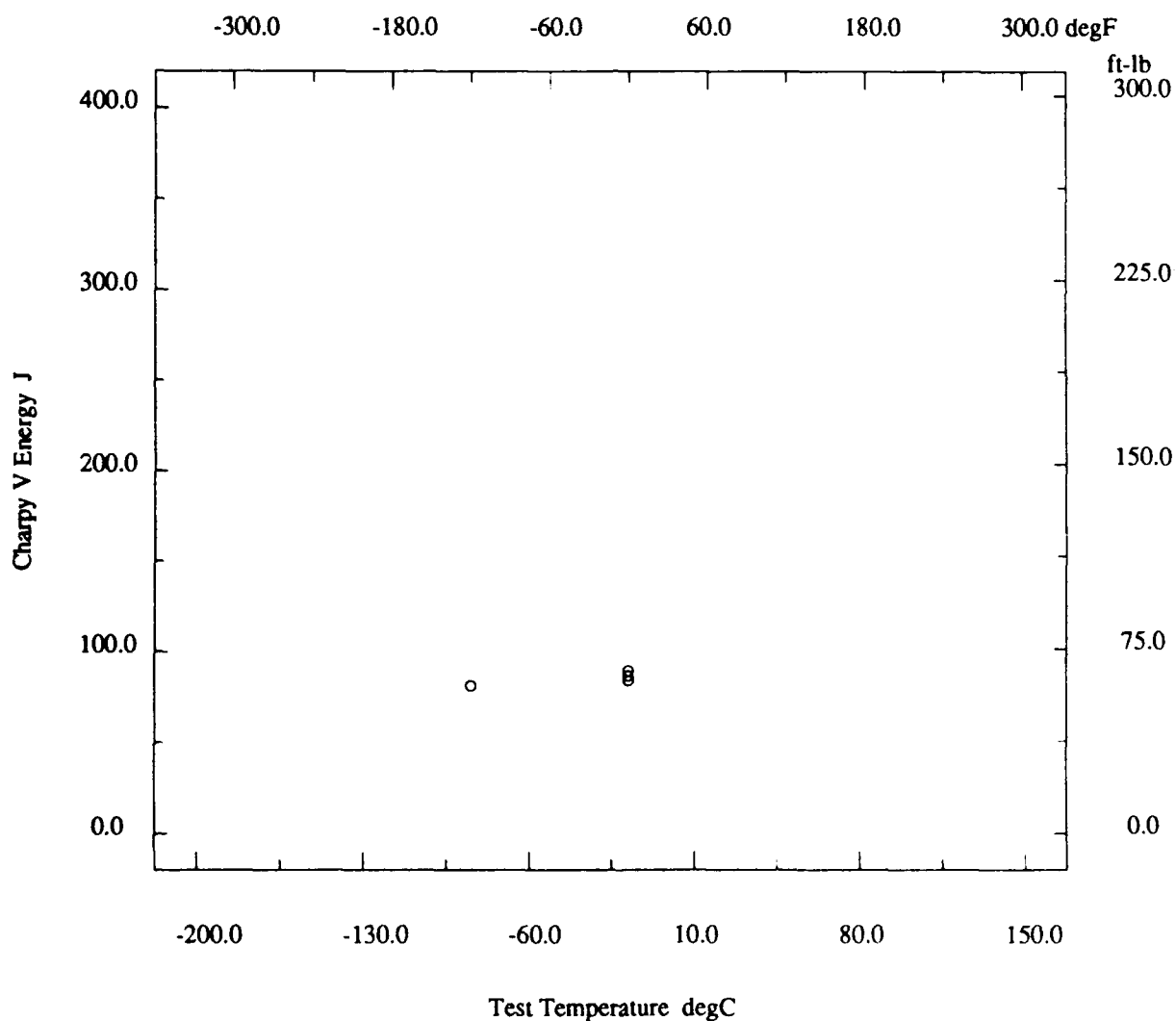
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-120	60
T-L ◯	-120	60
T-L ◯	-120	60
T-L ◯	0	62
T-L ◯	0	64
T-L ◯	0	66

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.16

<b>Description</b>			
Material Code	001.013.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.17

<b>Description</b>						
Material Code	001.013.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3975-3E			
Reference	USN-1					
<b>Composition</b>		See Page 17700.1				
<b>Fabrication History</b>		See Page 17700.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	106.1	90.5	*	22	64.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.18

<b>Description</b>	
Material Code . . . . .	001.013.01M2
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	2.25 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	D3975-3E
<b>Composition</b>	
See Page 17700.1	
<b>Fabrication History</b>	
See Page 17700.11	
<b>Property Measurements</b>	
Test Type . . . . .	Charpy V Impact
Specimen Type . . . . .	Full
Shear Fracture . . . . .	*
Did Specimen Split? . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Lateral Expansion . . . . .	*
Did Specimen Fracture? . . . . .	Assumed
Standard Method . . . . .	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	55
T-L ◦	-120	56
T-L ◦	-120	59
T-L ◦	0	60
T-L ◦	0	62
T-L ◦	0	68

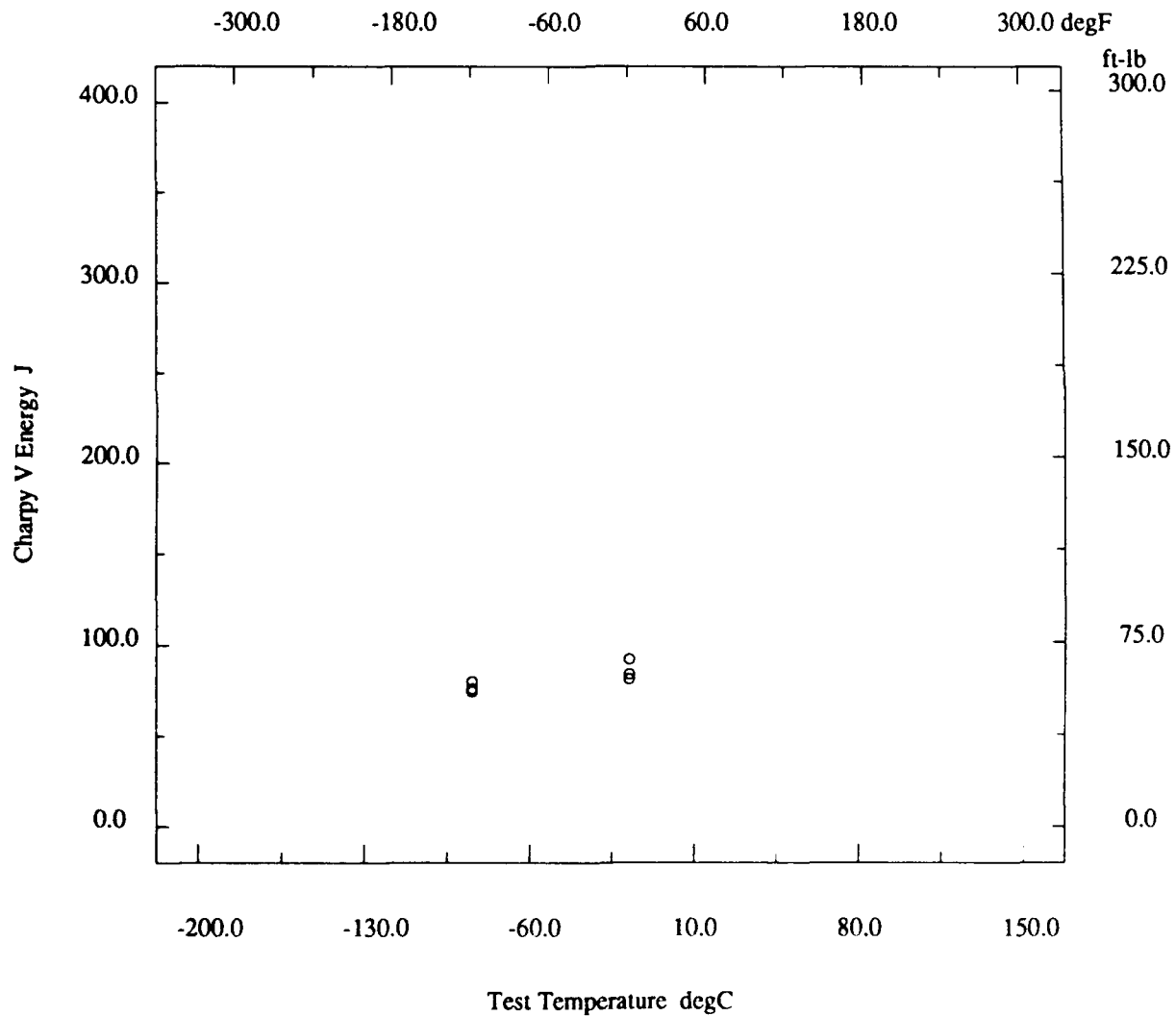
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.19

Description			
Material Code	001.013.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.20

<b>Description</b>	
Material Code . . . . .	001.013.01B1
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	2.25 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	D3975-3E
<b>Composition</b>	
See Page 17700.1	
<b>Fabrication History</b>	
Heat Treatment . . . . .	A,Q,T
Year Produced . . . . .	1982
Source . . . . .	*
Ingot Position . . . . .	Bottom
Process Temperature . . . . .	1660 degF
Rolling Conditions . . . . .	75 %
Final Temperature . . . . .	1280 degF
Cold Work Strain . . . . .	*
Aging Time . . . . .	*
Producer . . . . .	*
Addl Info . . . . .	No
Melting Practice . . . . .	*
Killing Process . . . . .	*
Process Time . . . . .	2.46 hr
Final Processing . . . . .	A,Q,T
Final Time . . . . .	2.25 hr
Aging Temperature . . . . .	*
Location . . . . .	*
<b>Property Measurements</b>	
Test Type . . . . .	Tensile
Specimen Type . . . . .	*
Gage Length . . . . .	*
Tensile Strength Offset . . . . .	*
Tensile Modulus . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Specimen Thickness . . . . .	*
Loading Rate . . . . .	*
Uniform Elongation . . . . .	*
Standard Method . . . . .	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	101.5	87.3	*	23	66.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.21

<b>Description</b>	
Material Code . . . . . 001.013.01B1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 2.25 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . D3975-3E
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 17700.1	
<b>Fabrication History</b> . . . . . See Page 17700.20	
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	54
T-L ◦	-120	58
T-L ◦	-120	66
T-L ◦	0	70
T-L ◦	0	76
T-L ◦	0	76

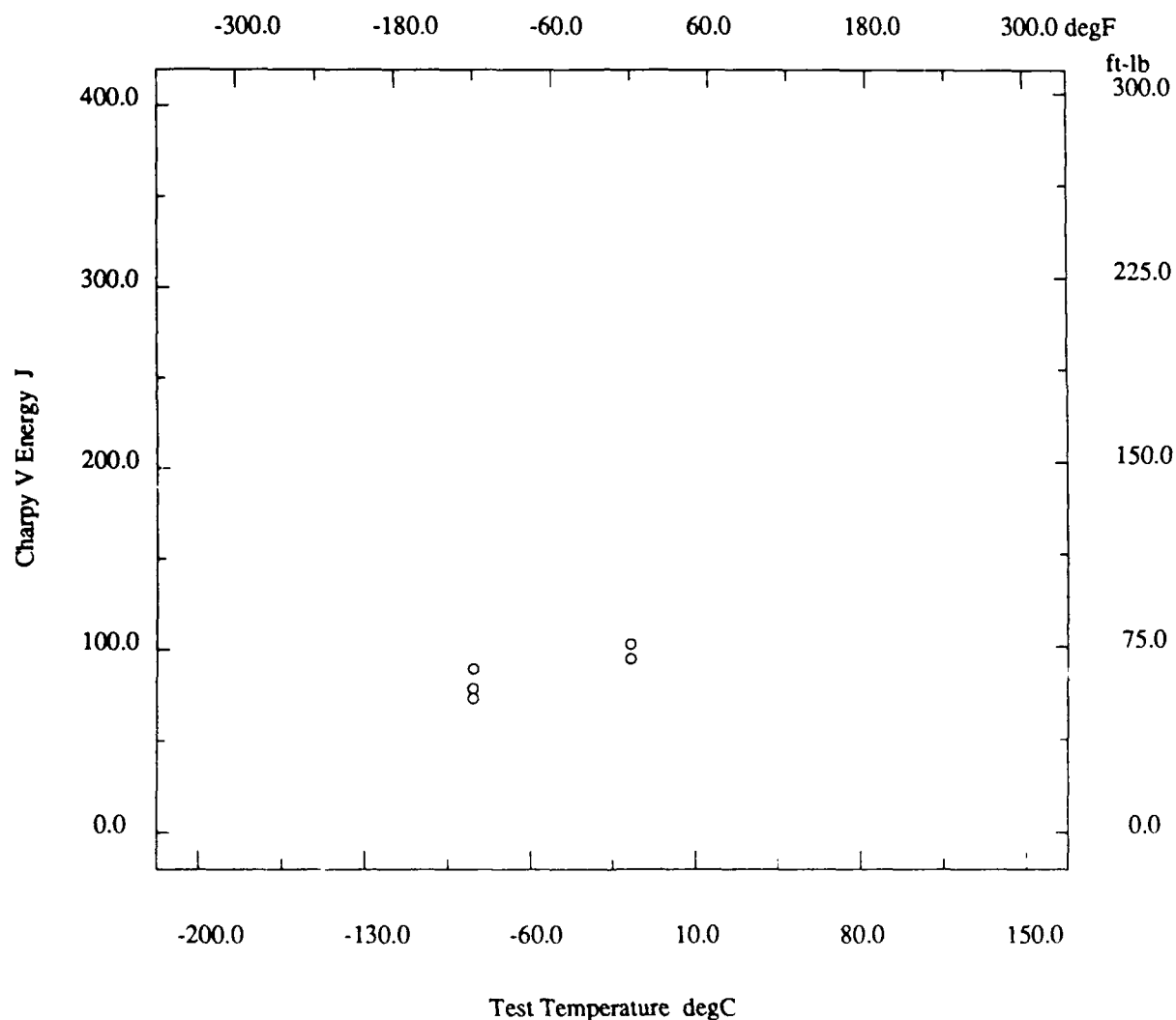
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.22

Description			
Material Code	001.013.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17700.23

<b>Description</b>							
Material Code	001.013.01BM	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	2.25 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	D3975-3E				
Reference	USN-1						
<b>Composition</b>		See Page 17700.1					
<b>Fabrication History</b>		See Page 17700.20					
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA	
	degF	ksi	ksi	ksi	%	%	
T	Room	106.0	90.2	*	22	64.3	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.24

<b>Description</b>			
Material Code	001.013.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		

<b>Composition</b>	See Page 17700.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17700.20
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	56
T-L ◊	-120	63
T-L ◊	-120	65
T-L ◊	0	60
T-L ◊	0	60
T-L ◊	0	64

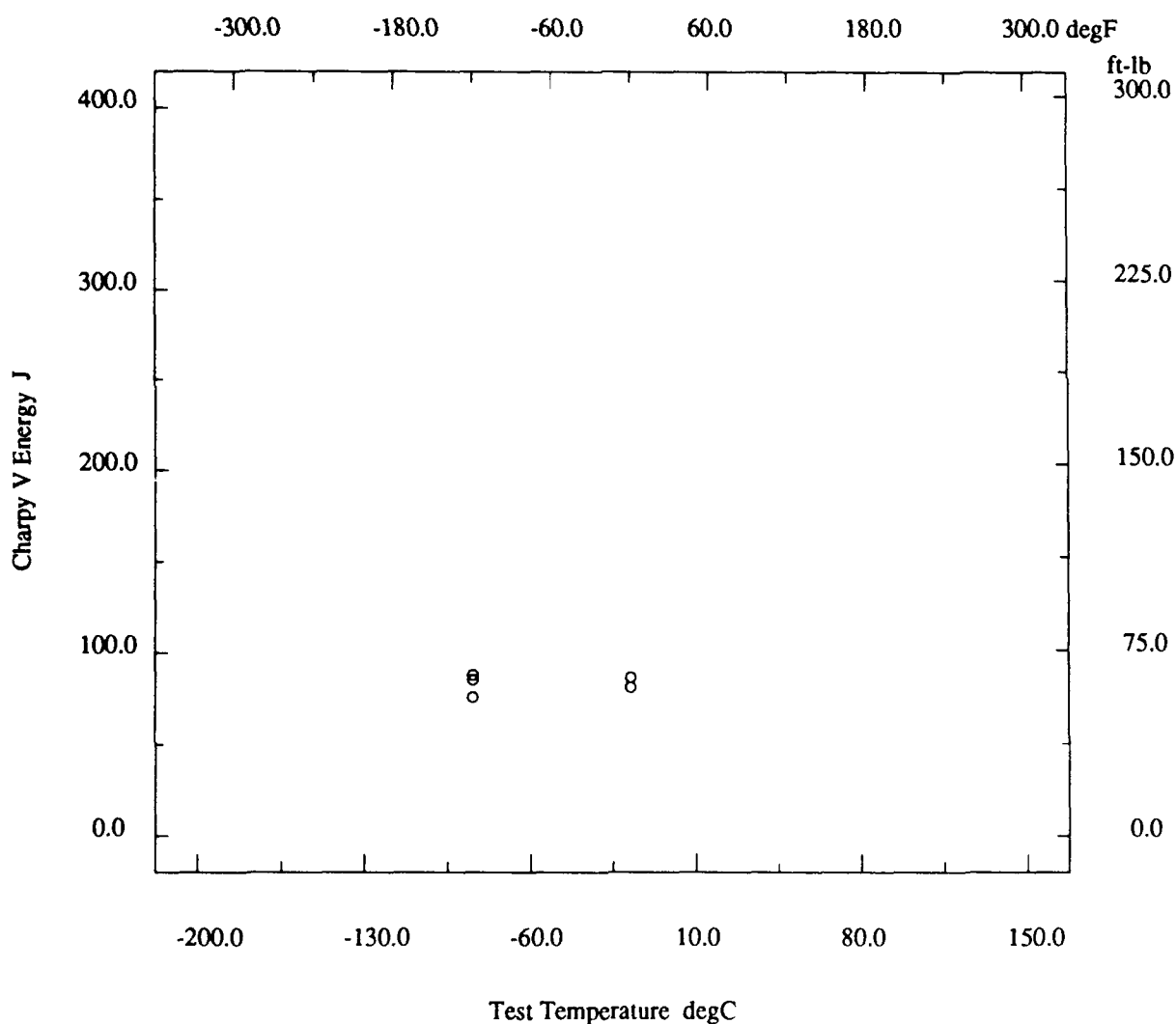
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.25

Description			
Material Code	001.013.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.26

<b>Description</b>						
Material Code	001.013.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.25 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3975-3E			
Reference	USN-1					
<b>Composition</b>		See Page 17700.1				
<b>Fabrication History</b>		See Page 17700.20				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	107.0	92.8	*	22	62.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.27

Description			
Material Code	001.013.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		
Composition		See Page 17700.1	
Fabrication History		See Page 17700.20	
Property Measurements			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	55
T-L °	-120	56
T-L °	-120	60
T-L °	0	58
T-L °	0	68
T-L °	0	68

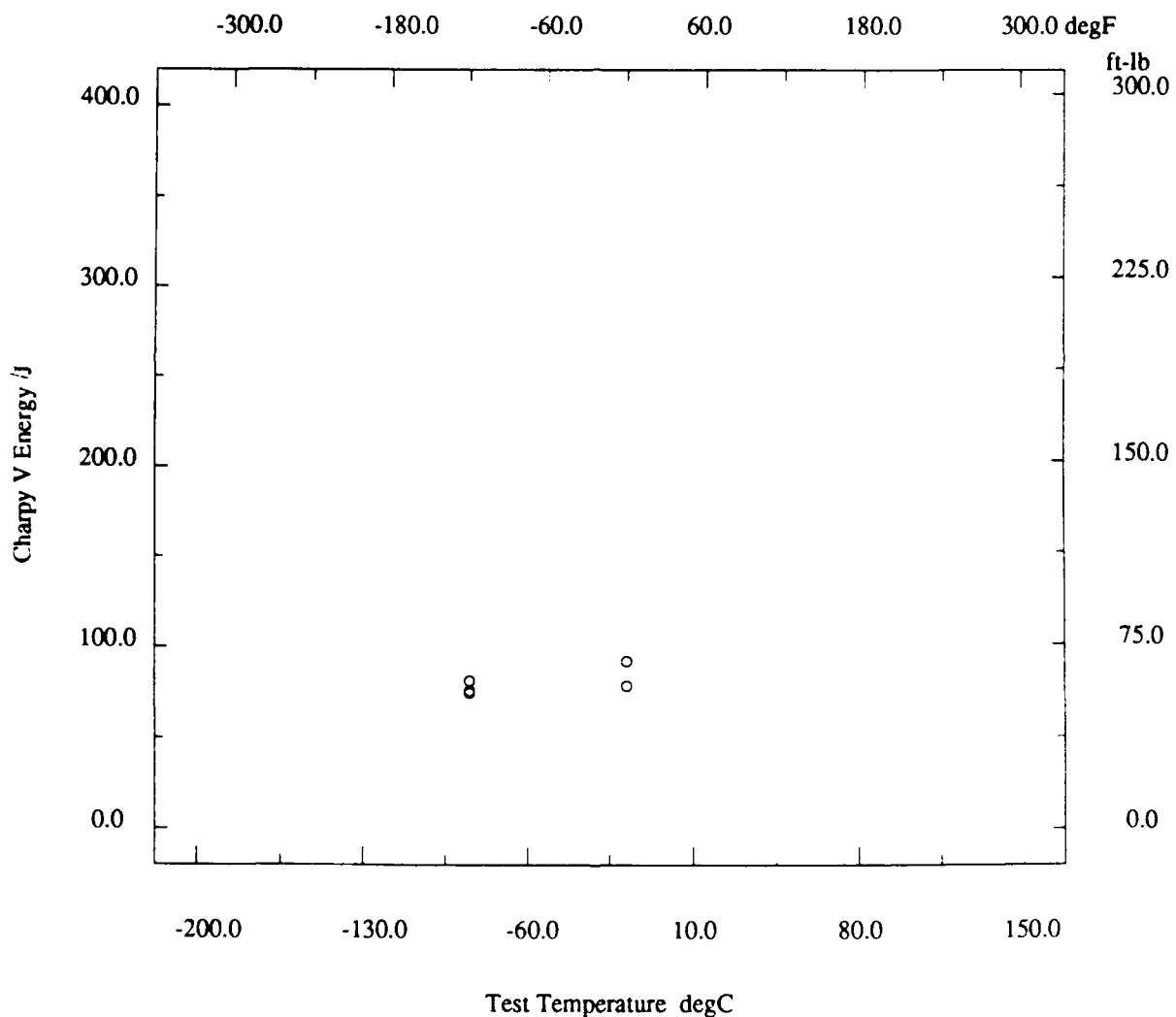
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17700.28

Description			
Material Code	001.013.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.25 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3975-3E
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17800.1

<b>Description</b>			
Material Code	001.014.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.13 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8478-3
Reference	USN-1		
<b>Composition</b>			
C	0.15 %	Mn	0.29 %
P	0.013 %	S	0.011 %
Si	0.28 %	Cr	1.47 %
Ni	2.72 %	Mo	0.39 %
V	0.007 %	Cu	0.15 %
Cb	*	Ti	0.003 %
B	*	Al	0.023 %
N	*	Other Components	As=0.007;Sn=0.013;Sb=0.005 %
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Top	Killing Process	*
Process Temperature	1660 degF	Process Time	2.3 hr
Rolling Conditions	92 %	Final Processing	A,Q,T
Final Temperature	1260 degF	Final Time	2.3 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	109.0	93.5	*	24	68

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17800.2

<b>Description</b>			
Material Code	001.014.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.13 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8478-3
Reference	USN-1		

**Composition** See Page 17800.1

**Fabrication History** See Page 17800.1

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T ◯	-120	46
L-T ◯	-120	49
L-T ◯	-120	51
L-T ◯	-120	53
L-T ◯	-120	71
L-T ◯	-40	76
L-T ◯	-40	77
L-T ◯	-40	85
L-T ◯	-40	87
L-T ◯	-40	88
L-T ◯	0	78
L-T ◯	0	81
L-T ◯	0	91
L-T ◯	0	92
L-T ◯	0	93
L-T ◯	32	80
L-T ◯	32	81
L-T ◯	32	82
L-T ◯	32	86
L-T ◯	32	93
L-T ◯	70	83
L-T ◯	70	84
L-T ◯	70	86
L-T ◯	70	88
L-T ◯	70	93
T-L ▲	-120	47
T-L ▲	-120	56
T-L ▲	-120	67
T-L ▲	-120	68
T-L ▲	-120	71
T-L ▲	-40	68
T-L ▲	-40	71
T-L ▲	-40	73

\* - not reported

(continued)



## Marine Structural Toughness Data Bank

Material HY80

Page 17800.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L ▲	-40	76
T-L ▲	-40	76
T-L ▲	0	77
T-L ▲	0	78
T-L ▲	0	78
T-L ▲	0	78
T-L ▲	0	82
T-L ▲	32	73
T-L ▲	32	78
T-L ▲	32	78
T-L ▲	32	82
T-L ▲	32	84
T-L ▲	70	82
T-L ▲	70	82
T-L ▲	70	83
T-L ▲	70	84
T-L ▲	70	84

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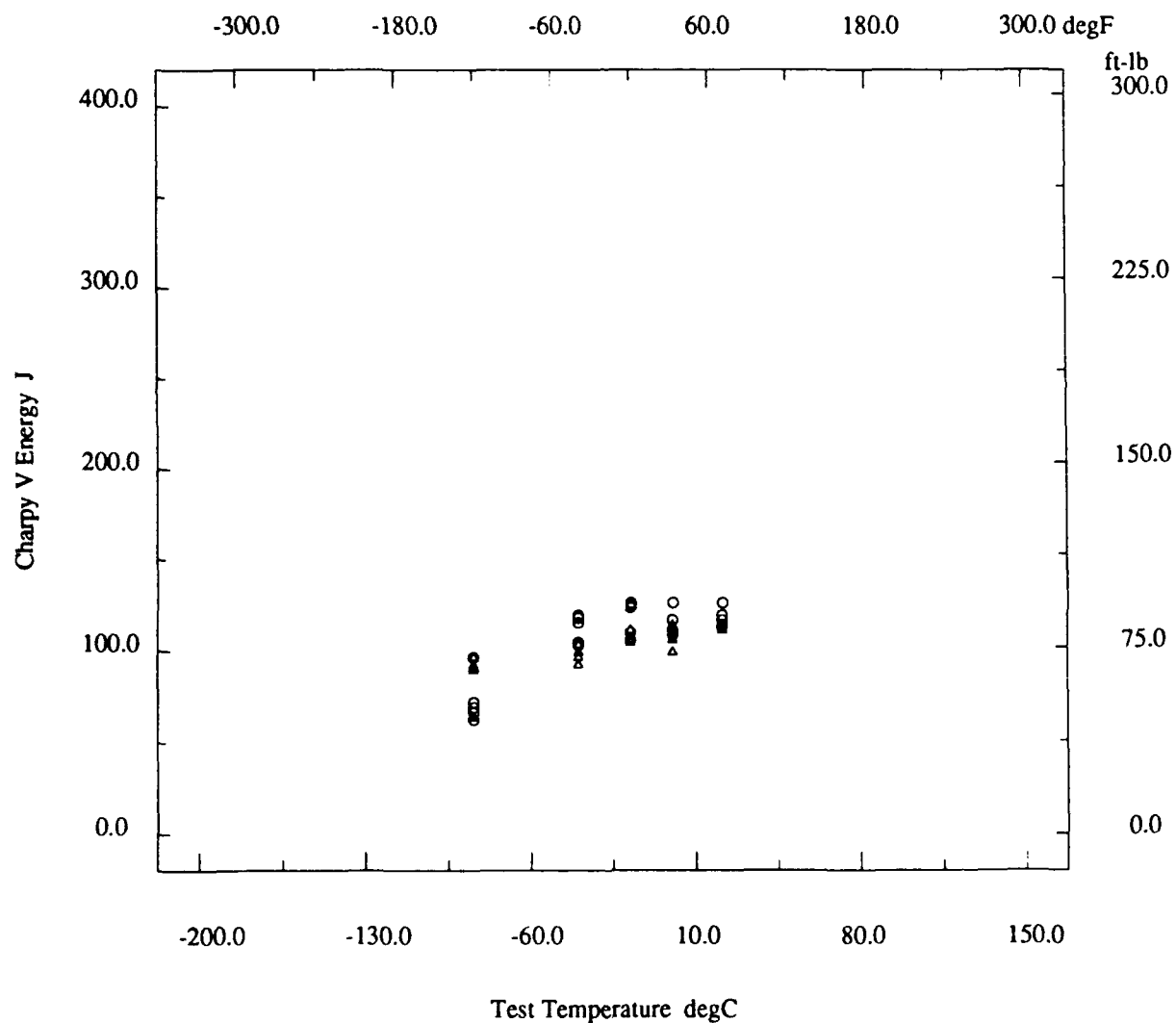
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17800.4

Description			
Material Code	001.014.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.13 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8478-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17800.5

<b>Description</b>	
Material Code .....	001.014.01B2
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	2.13 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	B8478-3
Reference .....	USN-1
<b>Composition</b>	
See Page 17800.1	
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Producer .....	*
Year Produced .....	1982
Addl Info .....	No
Source .....	*
Melting Practice .....	*
Ingot Position .....	Bottom
Killing Process .....	*
Process Temperature .....	1660 degF
Process Time .....	2.3 hr
Rolling Conditions .....	92 %
Final Processing .....	A,Q,T
Final Temperature .....	1260 degF
Final Time .....	2.3 hr
Cold Work Strain .....	*
Aging Temperature .....	*
Aging Time .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Position .....	1/4T
Specimen Type .....	*
Specimen Thickness .....	*
Gage Length .....	*
Loading Rate .....	*
Tensile Strength Offset .....	*
Uniform Elongation .....	*
Tensile Modulus .....	*
Standard Method .....	*
Standard Year .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	111.5	96.5	*	22	66

\* not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17800.6

<b>Description</b>	
Material Code . . . . . 001.014.01B2	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 2.13 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . B8478-3
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 17800.1	
<b>Fabrication History</b> . . . . . See Page 17800.5	
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	48
T-L ◦	-120	48
T-L ◦	-120	51
T-L ◦	0	60
T-L ◦	0	61
T-L ◦	0	62

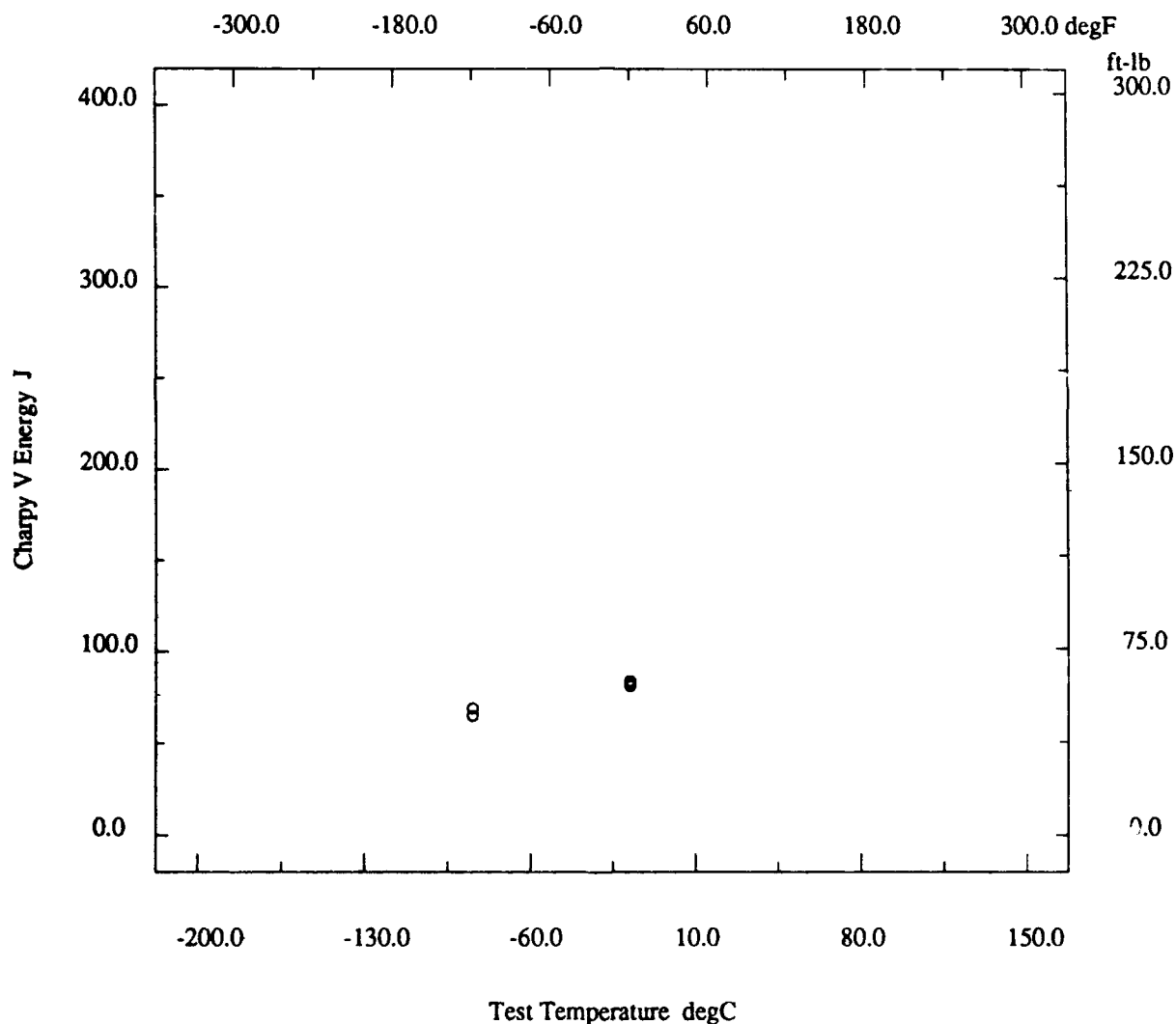
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17800.7

Description			
Material Code	001.014.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.13 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8478-3
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.1

<b>Description</b>			
Material Code	001.015.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>			
C	0.15 %	Mn	0.23 %
P	0.009 %	S	0.01 %
Si	0.20 %	Cr	1.42 %
Ni	2.78 %	Mo	0.38 %
V	0.01 %	Cu	0.13 %
Cb	*	Ti	0.002 %
B	*	Al	0.022 %
N	*	Other Components	As=0.009; Sn=0.008; Sb=0.003 %
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Top	Killing Process	*
Process Temperature	1660 degF	Process Time	2.15 hr
Rolling Conditions	83 %	Final Processing	A,Q,T
Final Temperature	1280 degF	Final Time	2.35 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4 T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.0	90.5	*	23	65.7

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.2

<b>Description</b>		
Material Code	001.015.01T1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	1.94 in	Composition Type Actual
Composition Position	Ladle	Lot ID D3710-42B
Reference	USN-1	
<b>Composition</b>		See Page 17900.1
<b>Fabrication History</b>		See Page 17900.1
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	130
L-T °	-120	131
L-T °	-120	138
L-T °	-120	139
L-T °	-120	146
L-T °	-40	122
L-T °	-40	138
L-T °	-40	142
L-T °	-40	149
L-T °	-40	158
L-T °	0	108
L-T °	0	112
L-T °	0	120
L-T °	0	126
L-T °	0	90
L-T °	32	120
L-T °	32	122
L-T °	32	129
L-T °	32	130
L-T °	32	138
L-T °	70	112
L-T °	70	120
L-T °	70	122
L-T °	70	138
L-T °	70	140
T-L ▲	-120	72
T-L ▲	-120	88
T-L ▲	-120	90
T-L ▲	-120	92
T-L ▲	-120	99
T-L ▲	-40	70
T-L ▲	-40	72
T-L ▲	-40	85

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	86
T-L Δ	-40	99
T-L Δ	0	70
T-L Δ	0	79
T-L Δ	0	82
T-L Δ	0	86
T-L Δ	0	88
T-L Δ	32	62
T-L Δ	32	76
T-L Δ	32	80
T-L Δ	32	82
T-L Δ	32	86
T-L Δ	70	80
T-L Δ	70	81
T-L Δ	70	86
T-L Δ	70	86
T-L Δ	70	90

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\* - not reported

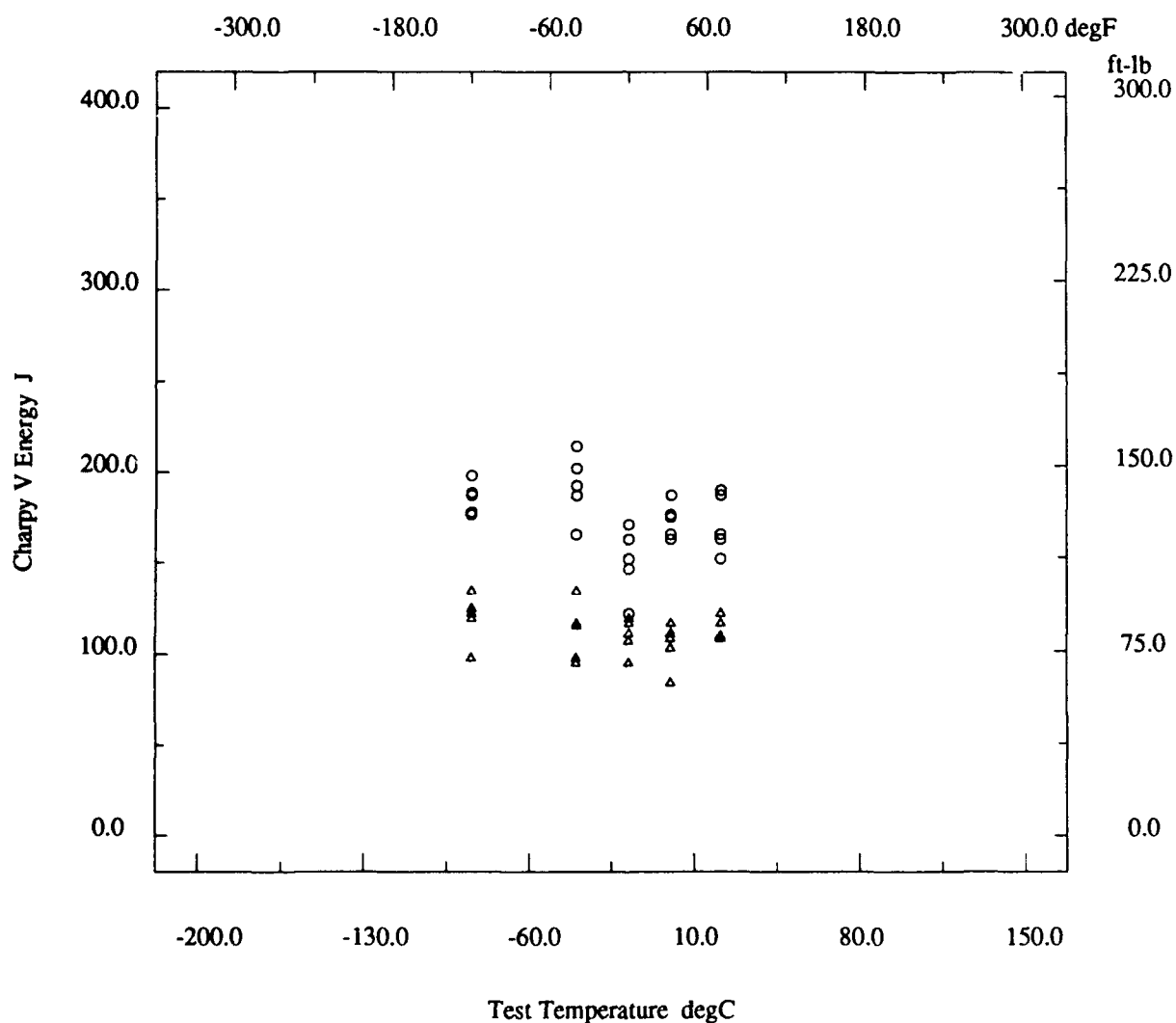


# Marine Structural Toughness Data Bank

Material HY80

Page 17900.4

<b>Description</b>			
Material Code	001.015.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.5

<b>Description</b>			
Material Code	001.015.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		

<b>Composition</b>	See Page 17900.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17900.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

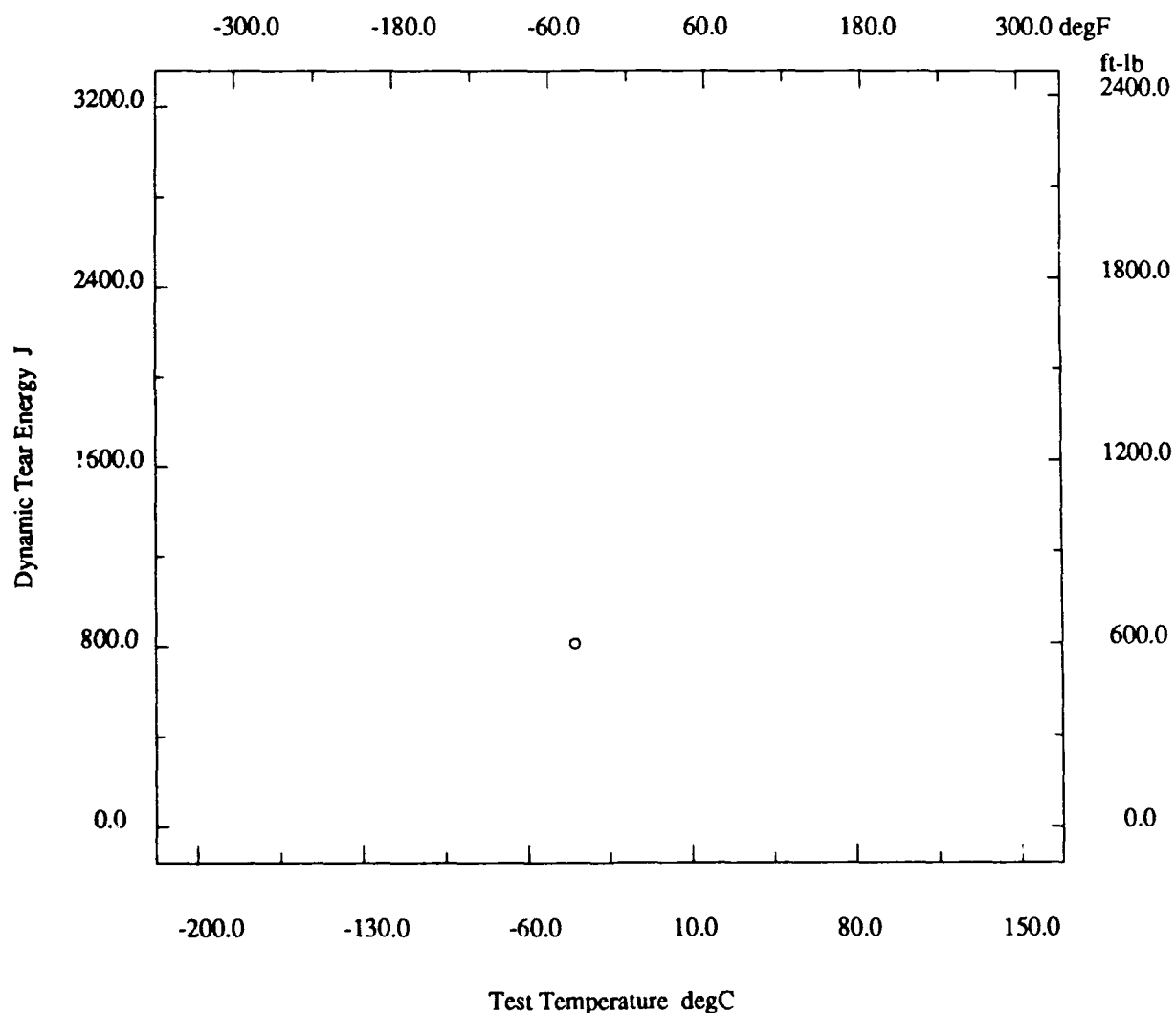
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	600	*

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.6

Description			
Material Code	001.015.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.7

<b>Description</b>						
Material Code	001.015.01TM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1.94 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3710-42B			
Reference	USN-1					
<b>Composition</b>		See Page 17900.1				
<b>Fabrication History</b>		See Page 17900.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	103.5	88.8	*	23	70.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.8

<b>Description</b>			
Material Code	001.015.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	76
T-L ◦	-120	88
T-L ◦	-120	98
T-L ◦	0	108
T-L ◦	0	110
T-L ◦	0	98

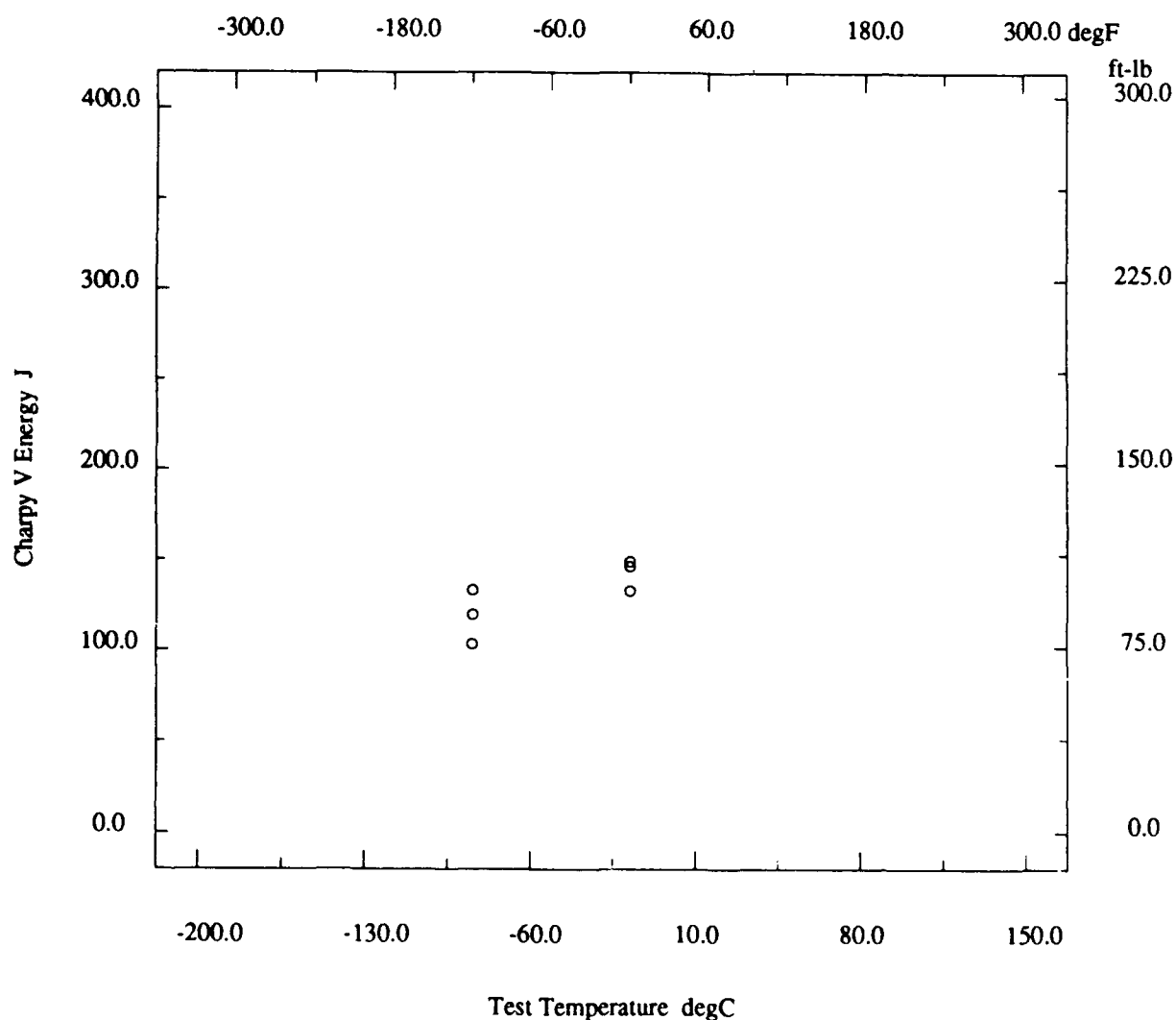
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.9

<b>Description</b>			
Material Code	001.015.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.10

<b>Description</b>			
Material Code	001.015.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	660	*

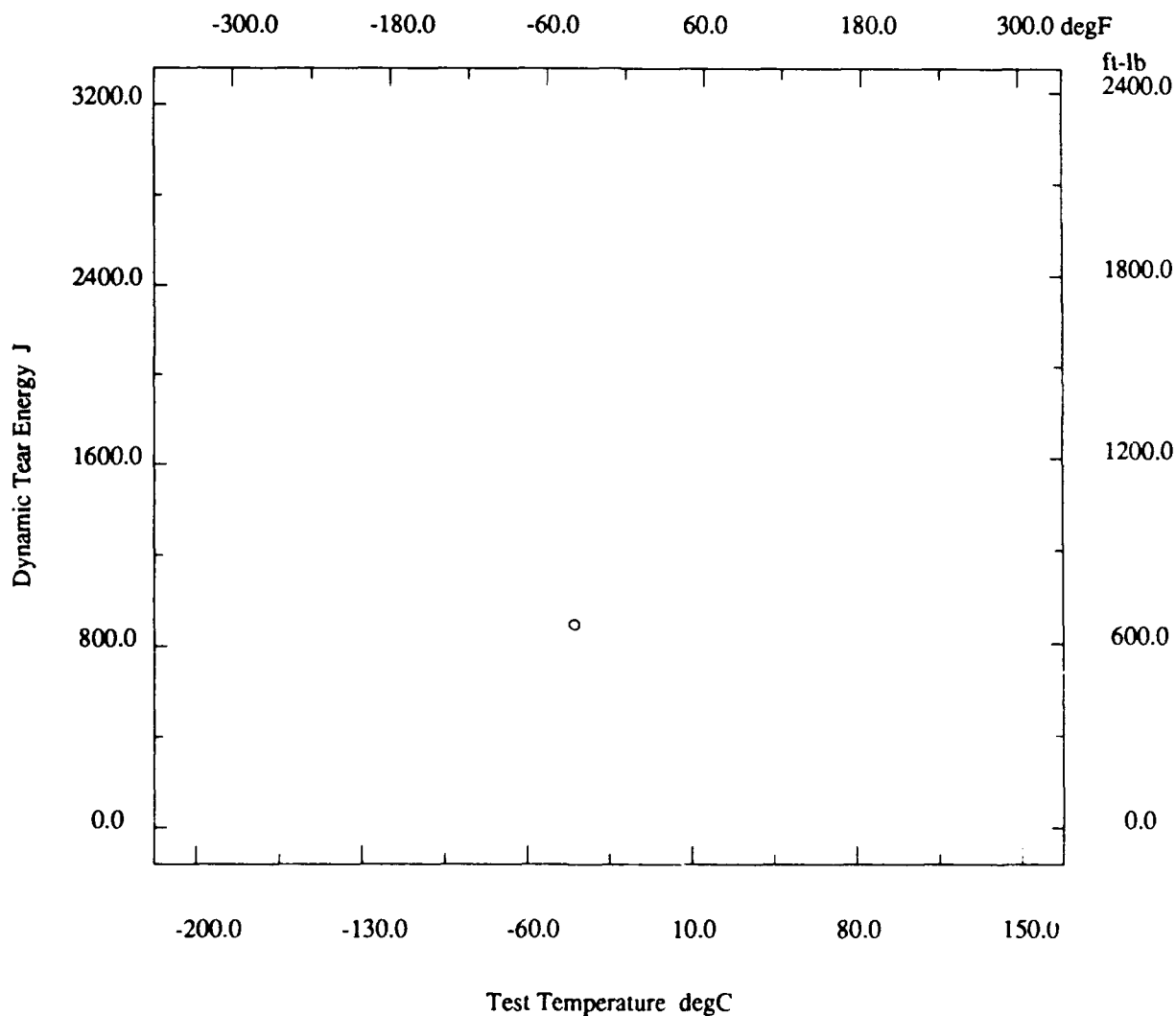
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.11

Description			
Material Code	001.015.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17900.12

<b>Description</b>						
Material Code	001.015.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1.94 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3710-42B			
Reference	USN-1					
<b>Composition</b>		See Page 17900.1				
<b>Fabrication History</b>		See Page 17900.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	103.0	88.9	*	24	70.4

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.13

<b>Description</b>	
Material Code . . . . . 001.015.01T2	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 1.94 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . D3710-42B
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 17900.1	
<b>Fabrication History</b> . . . . . See Page 17900.1	
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	76
T-L °	-120	82
T-L °	-120	90
T-L °	0	58
T-L °	0	66
T-L °	0	69

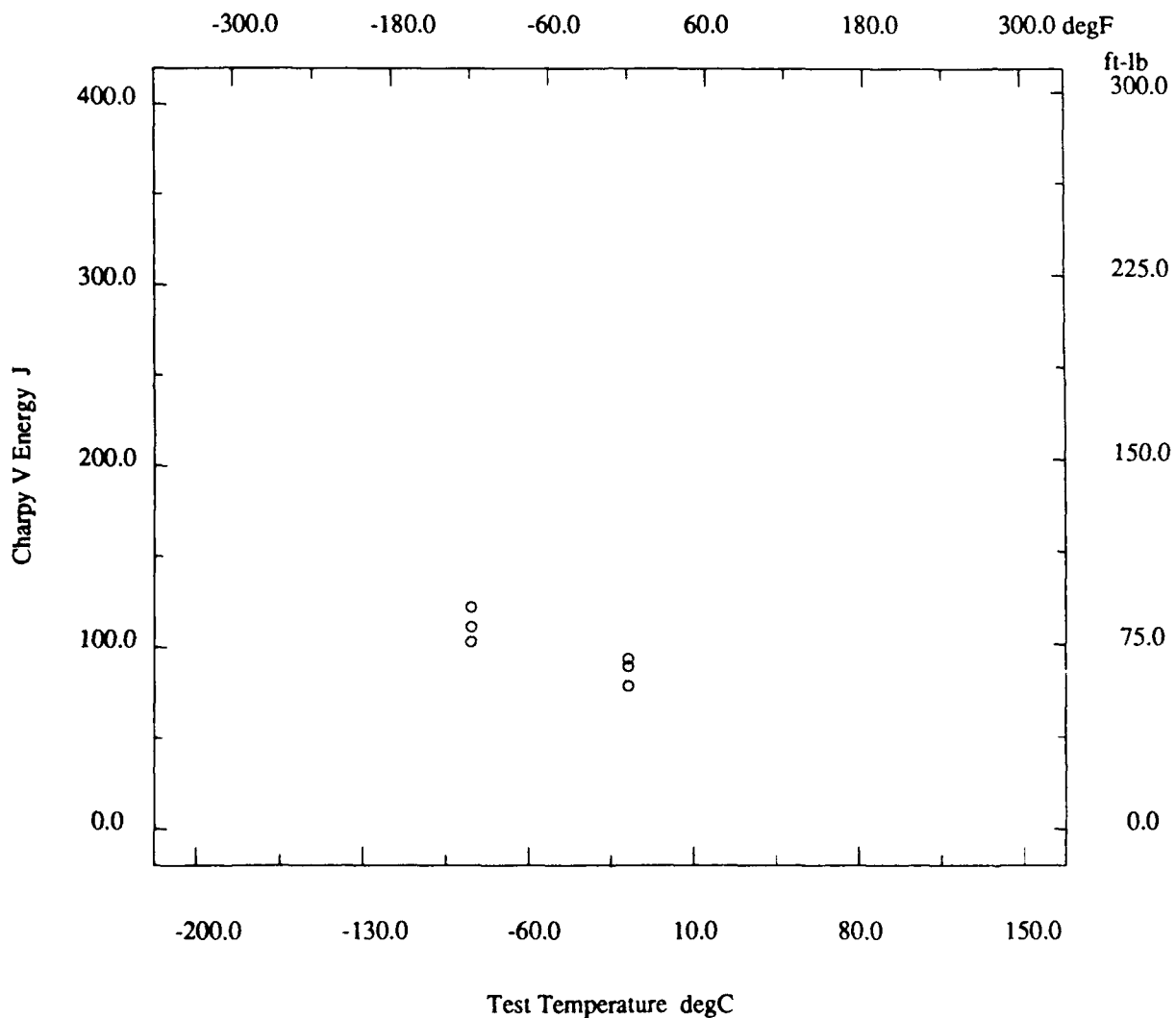
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.14

Description			
Material Code	001.015.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.15

<b>Description</b>			
Material Code	001.015.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L ◊	-40	560	*

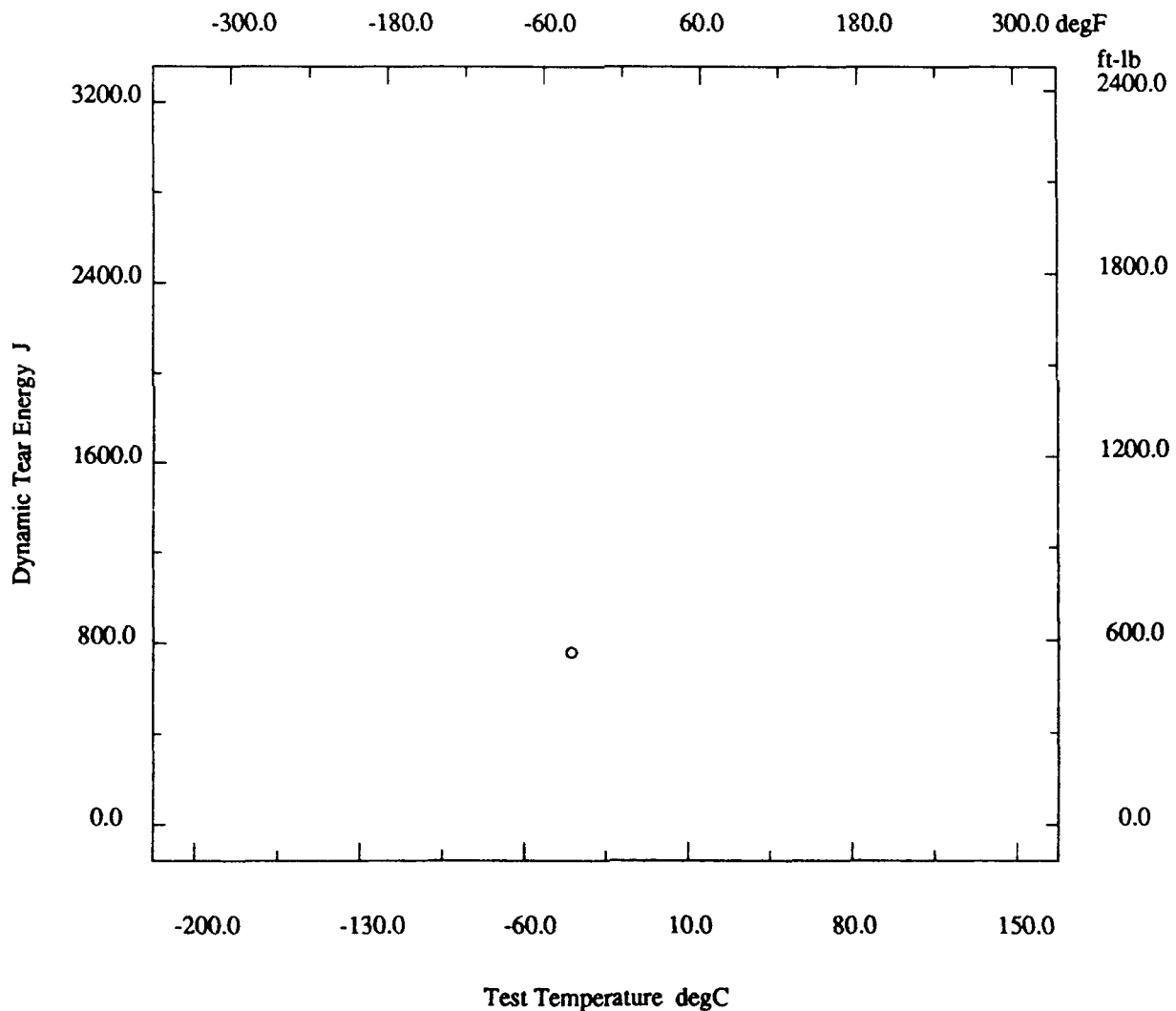
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.16

Description			
Material Code	001.015.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.17

<b>Description</b>	
Material Code . . . . .	001.015.01M1
UNS . . . . .	*
Type . . . . .	Wrought Metal
Thickness . . . . .	1.94 in
Composition Position . . . . .	Ladle
Reference . . . . .	USN-1
Material Name . . . . .	HY80
Other Designation . . . . .	*
Form . . . . .	Plate
Composition Type . . . . .	Actual
Lot ID . . . . .	D3710-42B
<b>Composition</b>	
See Page 17900.1	
<b>Fabrication History</b>	
Heat Treatment . . . . .	A,Q,T
Year Produced . . . . .	1982
Source . . . . .	*
Ingot Position . . . . .	Mid
Process Temperature . . . . .	1660 degF
Rolling Conditions . . . . .	83 %
Final Temperature . . . . .	1280 degF
Cold Work Strain . . . . .	*
Aging Time . . . . .	*
Producer . . . . .	*
Addl Info . . . . .	No
Melting Practice . . . . .	*
Killing Process . . . . .	*
Process Time . . . . .	2.15 hr
Final Processing . . . . .	A,Q,T
Final Time . . . . .	2.35 hr
Aging Temperature . . . . .	*
Location . . . . .	*
<b>Property Measurements</b>	
Test Type . . . . .	Tensile
Specimen Type . . . . .	*
Gage Length . . . . .	*
Tensile Strength Offset . . . . .	*
Tensile Modulus . . . . .	*
Standard Year . . . . .	*
Position . . . . .	1/4T
Specimen Thickness . . . . .	*
Loading Rate . . . . .	*
Uniform Elongation . . . . .	*
Standard Method . . . . .	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	106.5	91.8	*	23	68.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.18

<b>Description</b>	
Material Code .....	001.015.01M1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	1.94 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D3710-42B
Reference .....	USN-1
<b>Composition</b>	
See Page 17900.1	
<b>Fabrication History</b>	
See Page 17900.17	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	88
T-L °	-120	92
T-L °	-120	92
T-L °	0	100
T-L °	0	96
T-L °	0	99

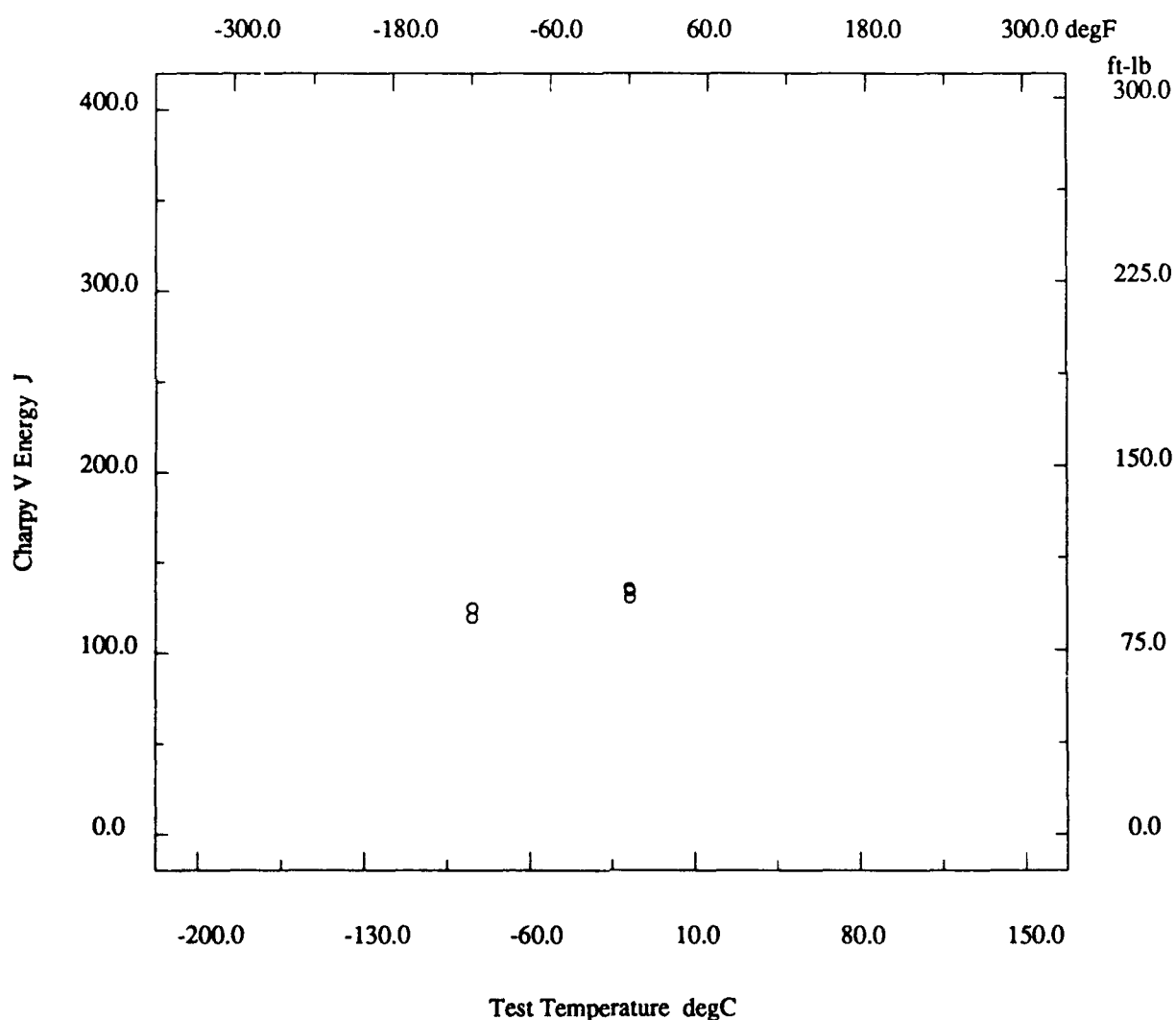
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.19

Description			
Material Code	001.015.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17900.20

<b>Description</b>			
Material Code	001.015.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		

<b>Composition</b>	See Page 17900.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17900.17
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L ◊	-40	815	*

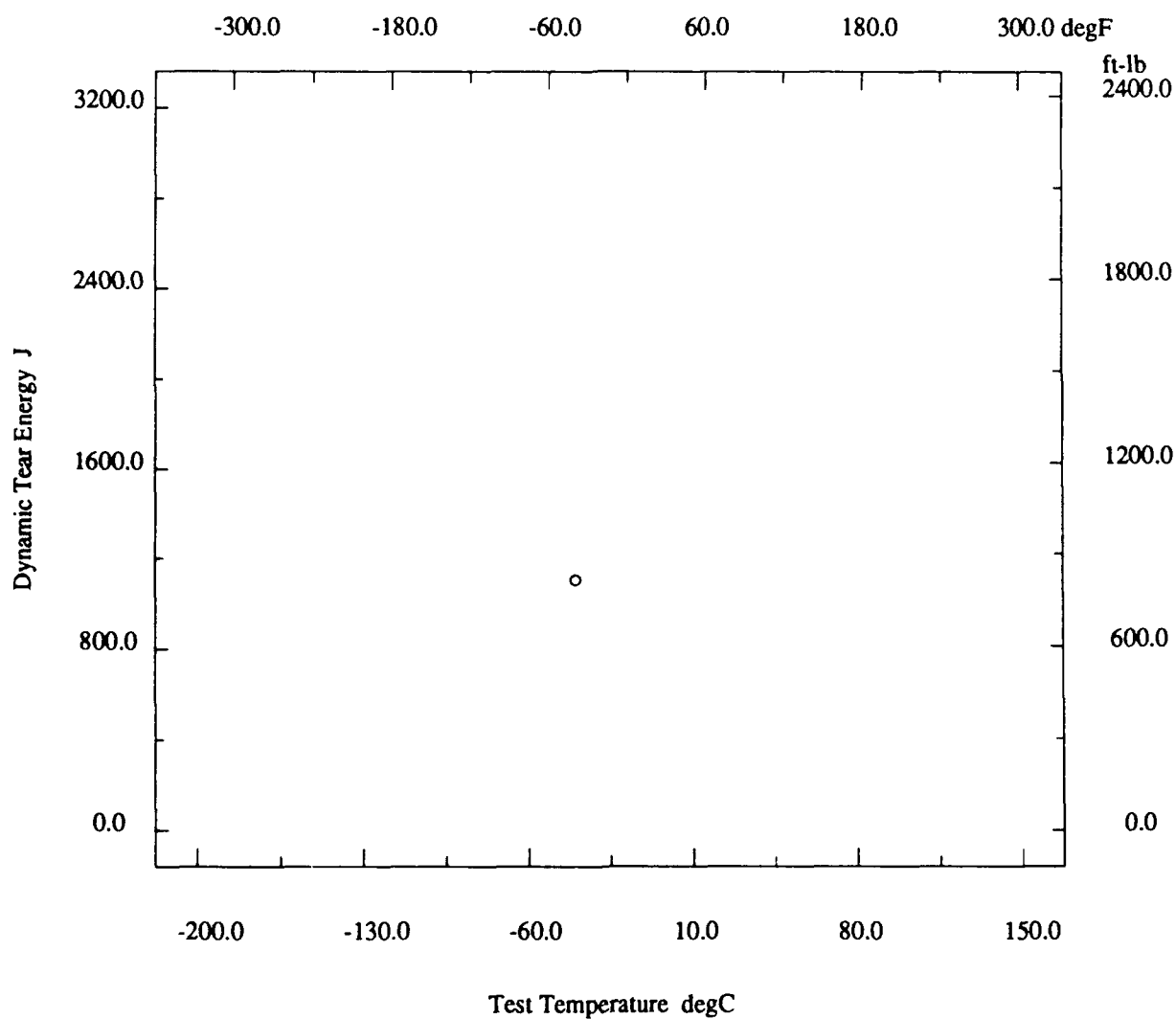
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.21

Description			
Material Code	001.015.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.22

<b>Description</b>						
Material Code	001.015.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1.94 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3710-42B			
Reference	USN-1					
<b>Composition</b>		See Page 17900.1				
<b>Fabrication History</b>		See Page 17900.17				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	106.5	91.7	*	23	66.9

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.23

<b>Description</b>			
Material Code	001.015.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		

<b>Composition</b>	See Page 17900.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17900.17
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L o	-120	78
T-L o	-120	90
T-L o	-120	96
T-L o	0	108
T-L c	0	110
T-L o	0	99

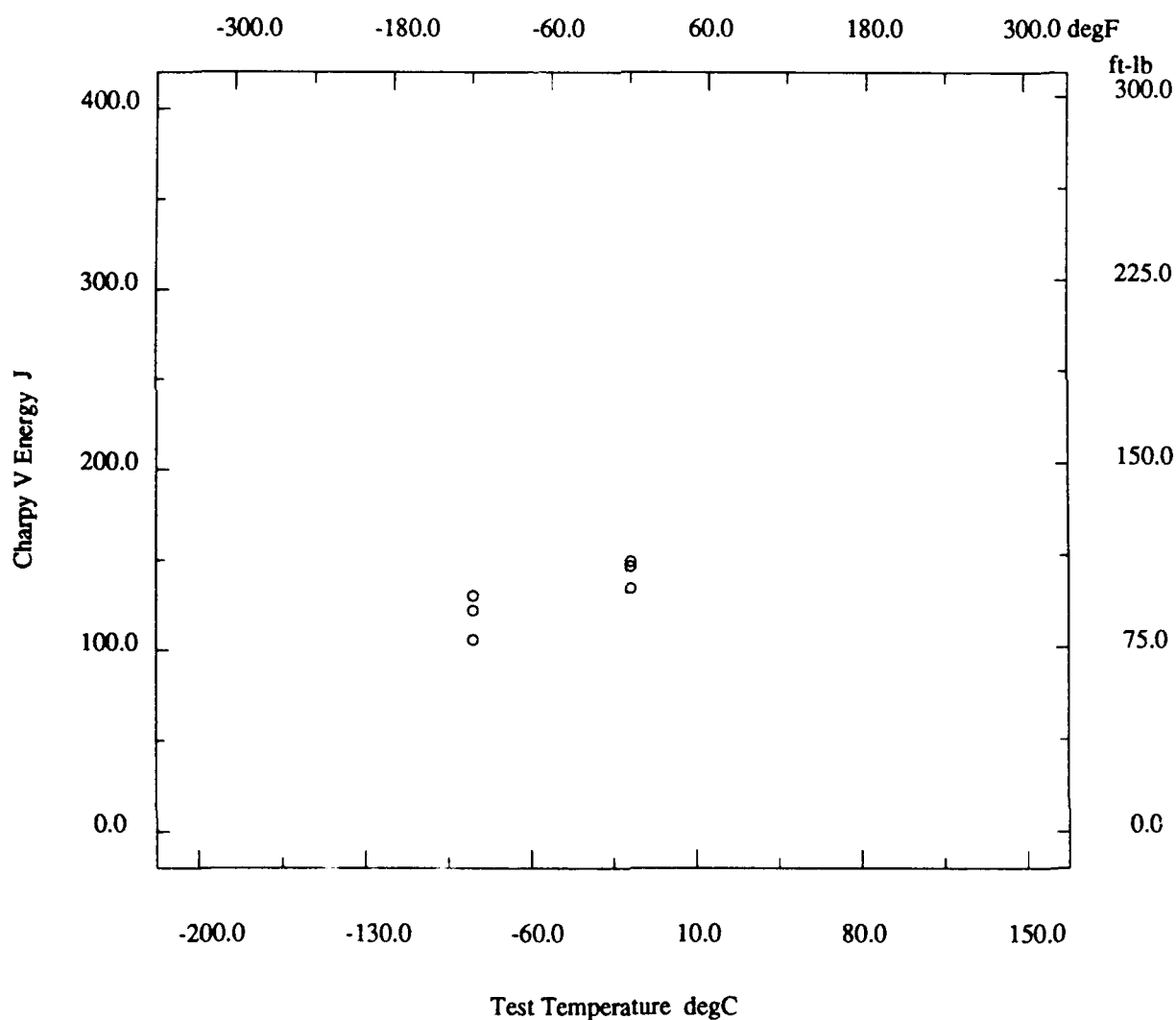
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.24

<b>Description</b>			
Material Code	001.015.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.25

<b>Description</b>			
Material Code	001.015.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.17	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	760	*

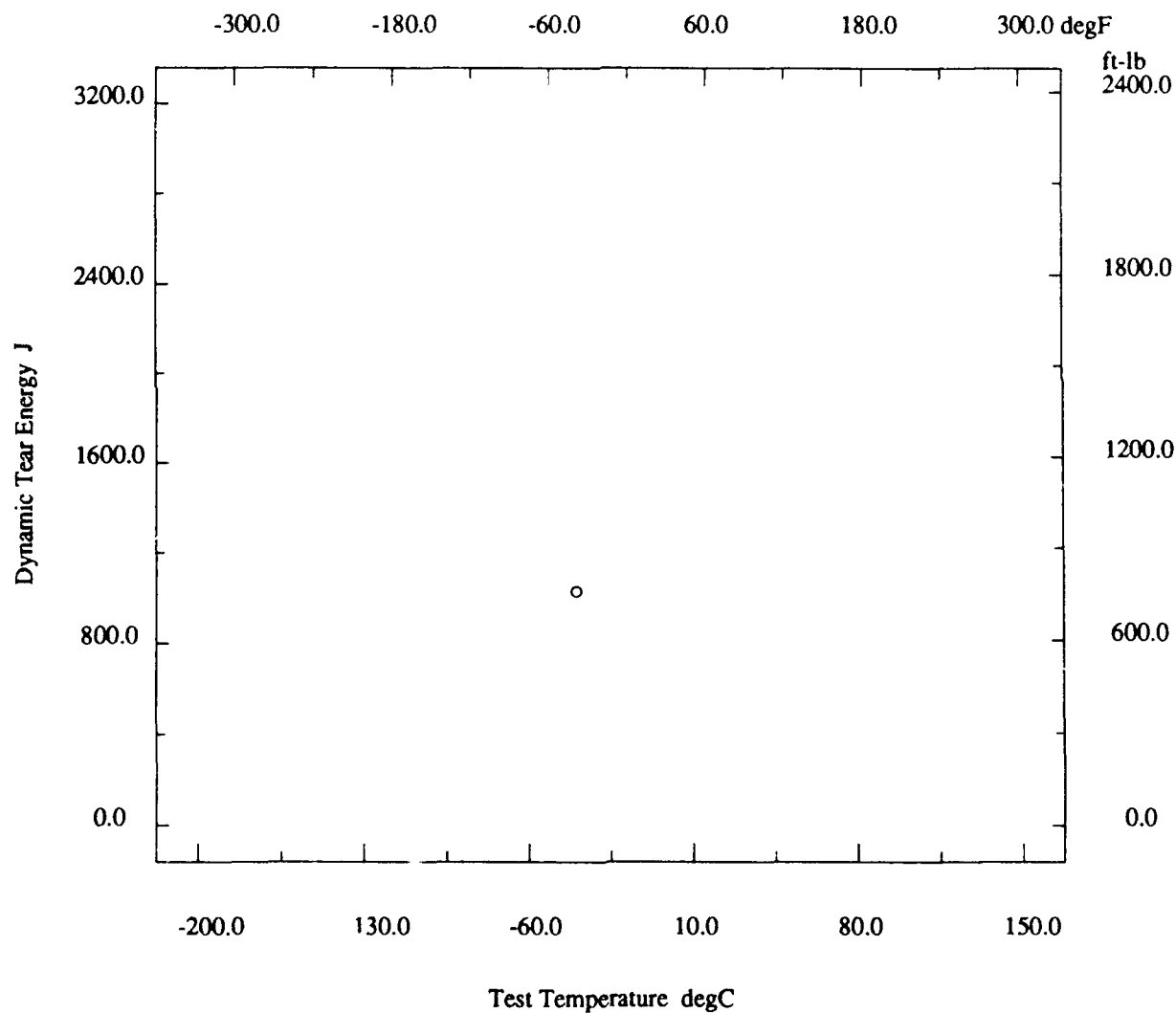
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.26

Description			
Material Code	001.015.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.27

<b>Description</b>						
Material Code	001.015.01M2					
UNS	*					
Type	Wrought Metal					
Thickness	1.94 in					
Composition Position	Ladle					
Reference	USN-1					
<b>Composition</b>						
See Page 17900.1						
<b>Fabrication History</b>						
See Page 17900.17						
<b>Property Measurements</b>						
Test Type	Tensile					
Specimen Type	*					
Gage Length	*					
Tensile Strength Offset	*					
Tensile Modulus	*					
Standard Year	*					
Position	1/4T					
Specimen Thickness	*					
Loading Rate	*					
Uniform Elongation	*					
Standard Method	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	107.0	92.3	*	24	69.2

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 17900.28

<b>Description</b>		
Material Code	001.015.01M2	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	1.94 in	Composition Type Actual
Composition Position	Ladle	Lot ID D3710-42B
Reference	USN-1	

**Composition** See Page 17900.1

**Fabrication History** See Page 17900.17

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ○	-120	102
T-L ○	-120	99
T-L ○	-120	99
T-L ○	0	110
T-L ○	0	116
T-L ○	0	118

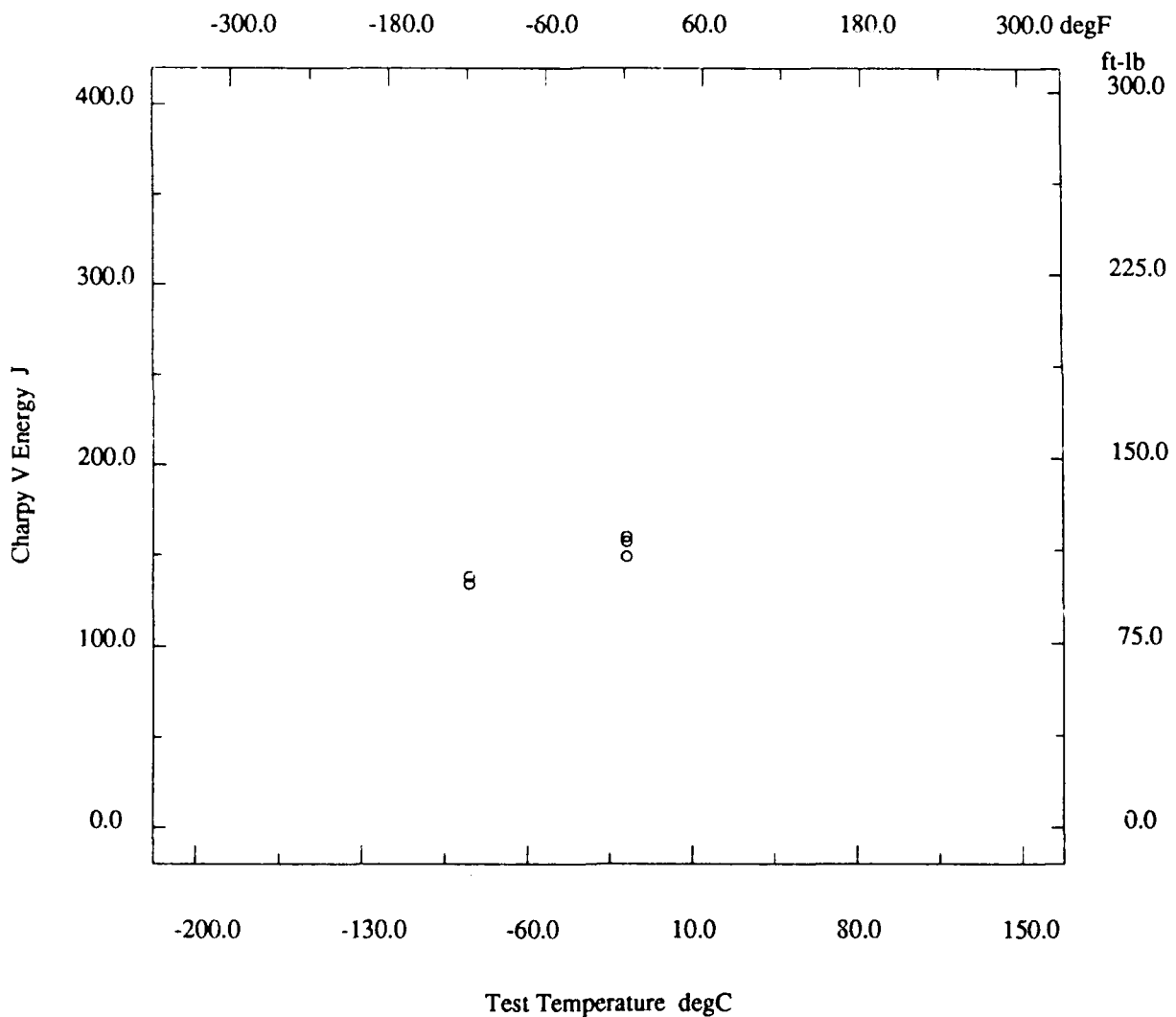
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.29

Description			
Material Code	001.015.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.30

<b>Description</b>			
Material Code	001.015.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.17	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	i/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*
Orien		Test Temp	DT Energy
		degF	ft-lb
T-L °		-40	820
			Frac Apear
			%
			*

\* - not reported

# Marine Structural Toughness Data Bank

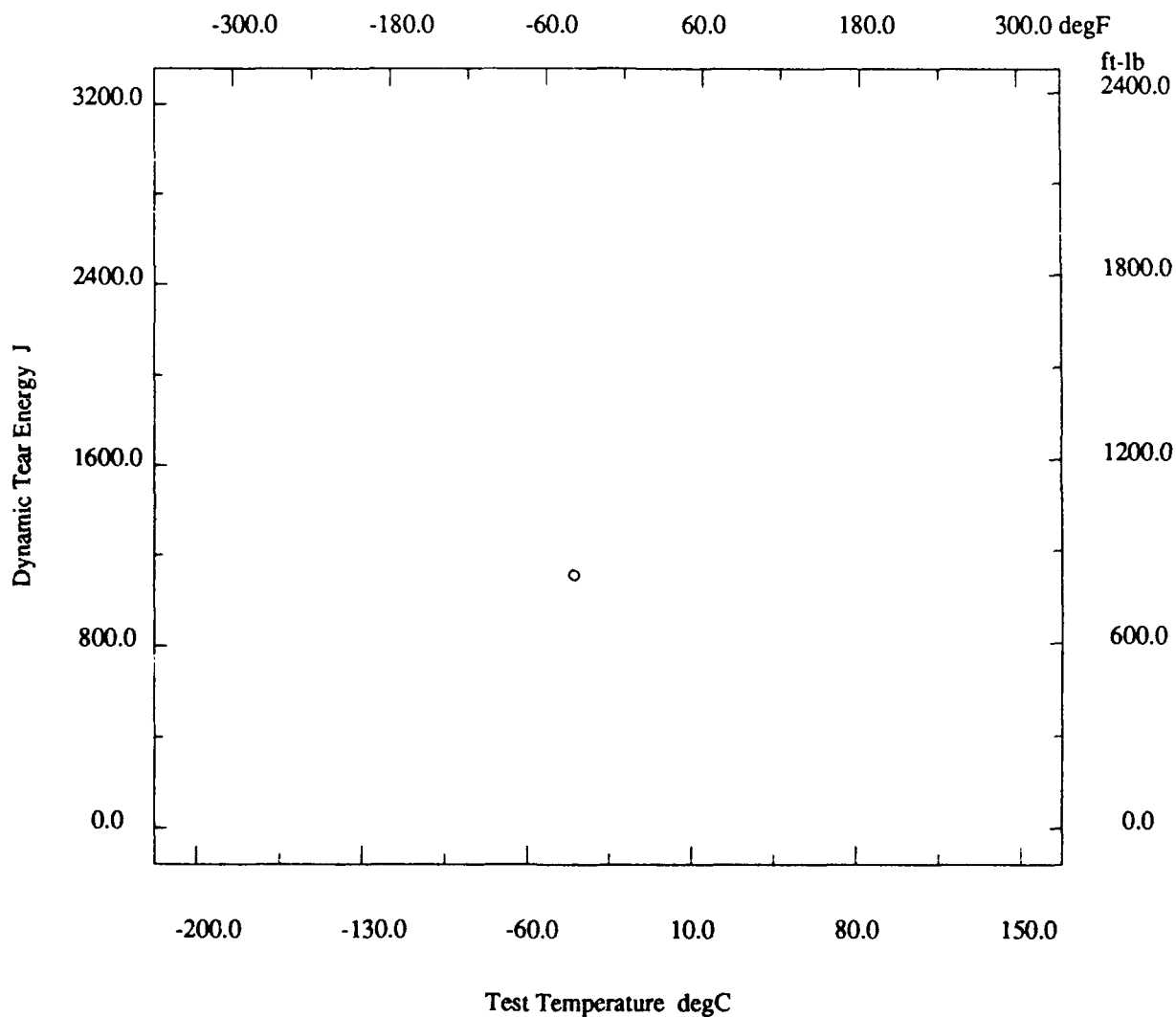
Material HY80

Page 17900.31

## Description

Material Code ..... 001.015.01M2  
 UNS ..... \*  
 Type ..... Wrought Metal  
 Thickness ..... 1.94 in  
 Composition Position ..... Ladle  
 Reference ..... USN-1

Material Name ..... HY80  
 Other Designation ..... \*  
 Form ..... Plate  
 Composition Type ..... Actual  
 Lot ID ..... D3710-42B



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.32

<b>Description</b>			
Material Code	001.015.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Bottom	Killing Process	*
Process Temperature	1660 degF	Process Time	2.15 hr
Rolling Conditions	83 %	Final Processing	A,Q,T
Final Temperature	1280 degF	Final Time	2.35 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.5	90.4	*	23	68.9

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.33

<b>Description</b>			
Material Code	001.015.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		

**Composition** See Page 17900.1

**Fabrication History** See Page 17900.32

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	94
T-L °	-120	98
T-L °	-120	98
T-L °	0	108
T-L °	0	99
T-L °	0	99

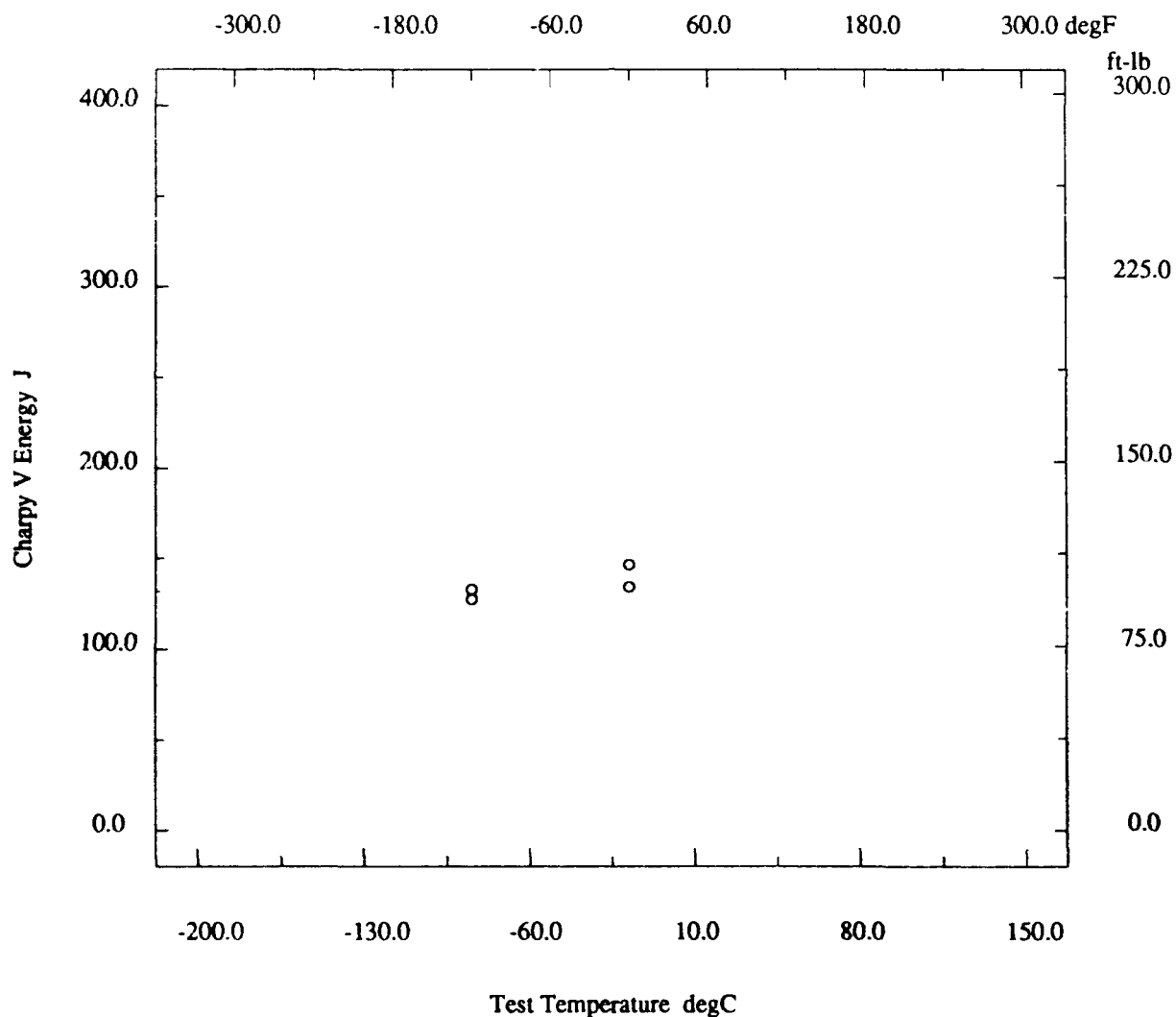
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.34

Description			
Material Code	001.015.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.35

<b>Description</b>			
Material Code	001.015.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		

**Composition** See Page 17900.1

**Fabrication History** See Page 17900.32

## Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	800	*

\* - not reported

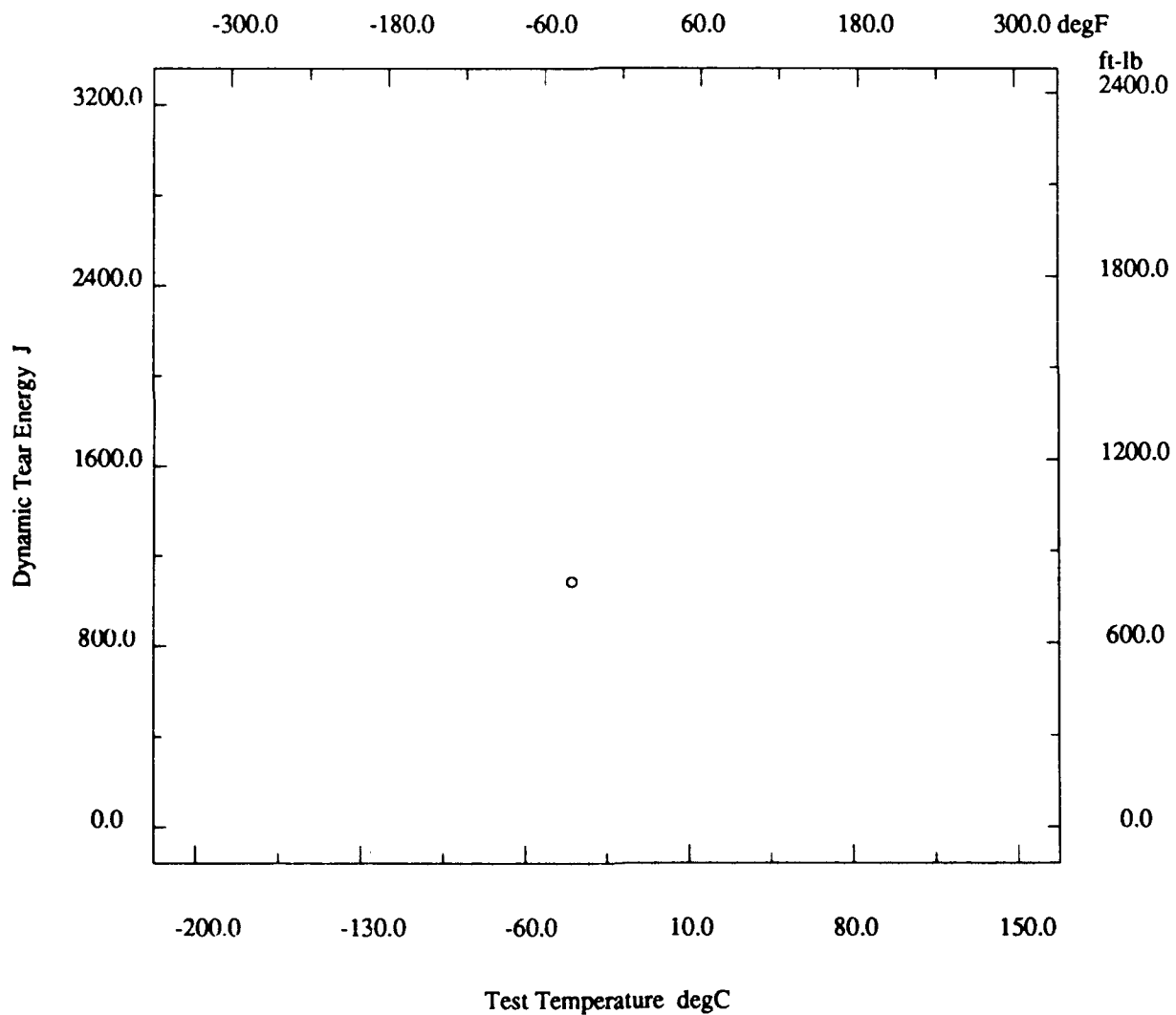


# Marine Structural Toughness Data Bank

Material HY80

Page 17900.36

Description			
Material Code	001.015.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.37

<b>Description</b>						
Material Code	001.015.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1.94 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3710-42B			
Reference	USN-1					
<b>Composition</b>		See Page 17900.1				
<b>Fabrication History</b>		See Page 17900.32				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	105.5	90.5	*	23	70.4

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.38

<b>Description</b>		
Material Code	001.015.01BM	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1.94 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3710-42B

**Composition** See Page 17900.1

**Fabrication History** See Page 17900.32

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	66
T-L °	-120	80
T-L °	-120	82
T-L °	0	80
T-L °	0	82
T-L °	0	86

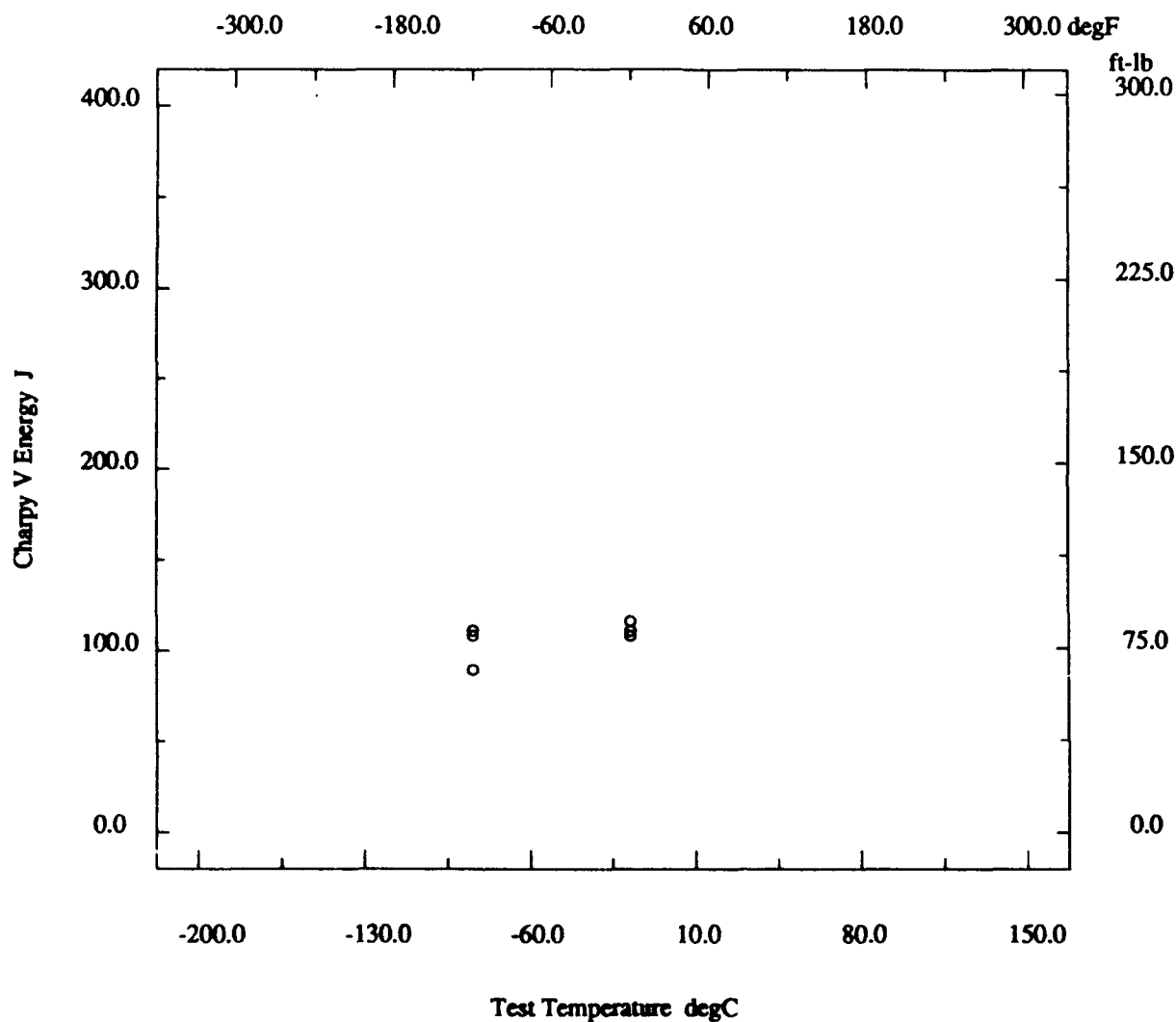
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.39

<b>Description</b>			
Material Code	001.015.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.40

<b>Description</b>			
Material Code	001.015.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.32	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L ◊	-40	820	*

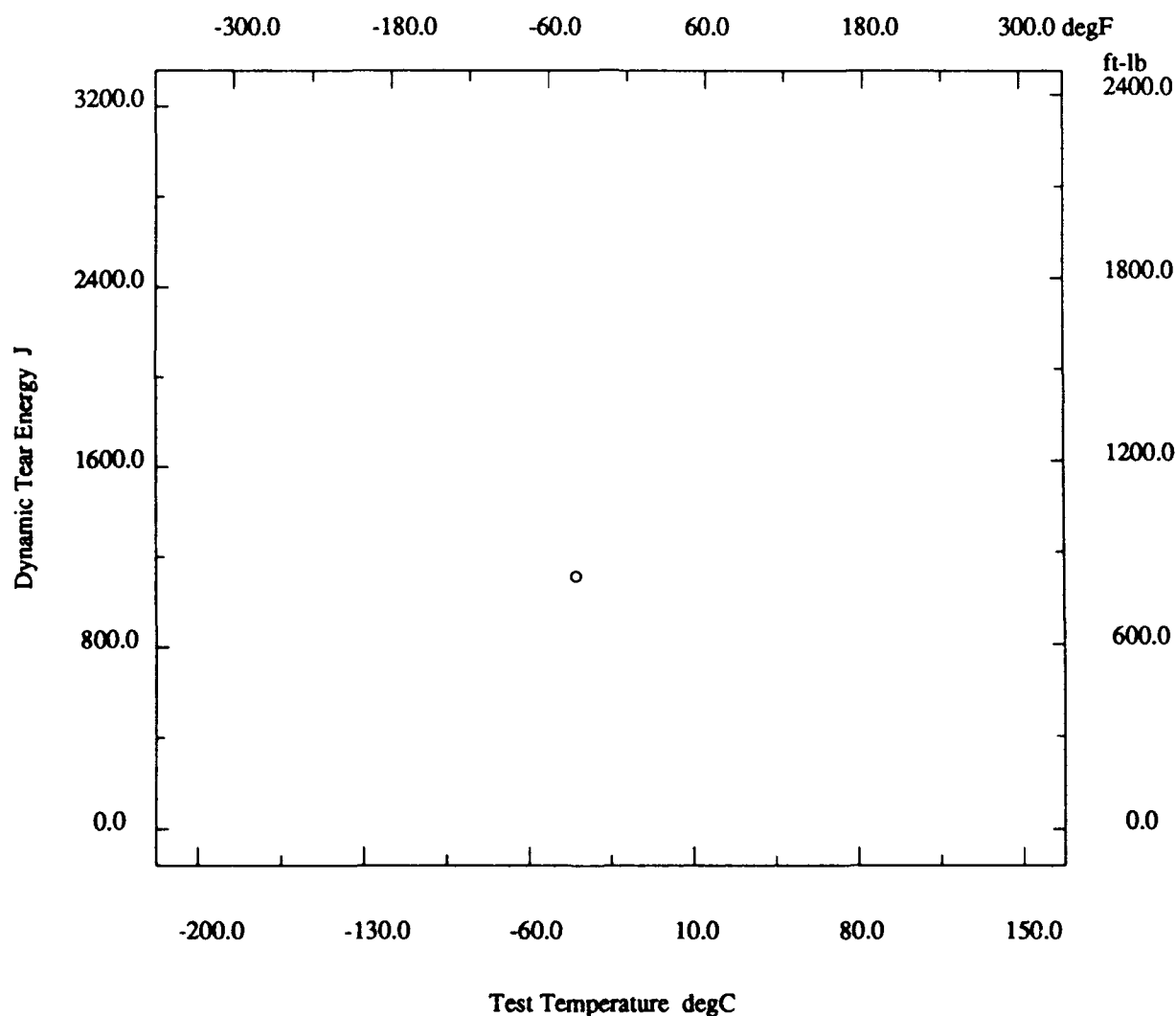
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.41

Description			
Material Code	001.015.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.42

<b>Description</b>						
Material Code	001.015.01B2		Material Name	HY80		
UNS	*		Other Designation	*		
Type	Wrought Metal		Form	Plate		
Thickness	1.94 in		Composition Type	Actual		
Composition Position	Ladle		Lot ID	D3710-42B		
Reference	USN-1					
<b>Composition</b>			See Page 17900.1			
<b>Fabrication History</b>			See Page 17900.32			
<b>Property Measurements</b>						
Test Type	Tensile		Position	1/4T		
Specimen Type	*		Specimen Thickness	*		
Gage Length	*		Loading Rate	*		
Tensile Strength Offset	*		Uniform Elongation	*		
Tensile Modulus	*		Standard Method	*		
Standard Year	*					
<b>Orient</b>	<b>Test Temp</b>	<b>UTS</b>	<b>TYS</b>	<b>TYP</b>	<b>Elongation</b>	<b>RA</b>
	degF	ksi	ksi	ksi	%	%
T	Room	106.0	91.5	*	23	69.0

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.43

<b>Description</b>			
Material Code	001.015.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		

<b>Composition</b>	See Page 17900.1
--------------------	------------------

<b>Fabrication History</b>	See Page 17900.32
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	92
T-L °	-120	98
T-L °	-120	98
T-L °	0	100
T-L °	0	110
T-L °	0	110

\* - not reported

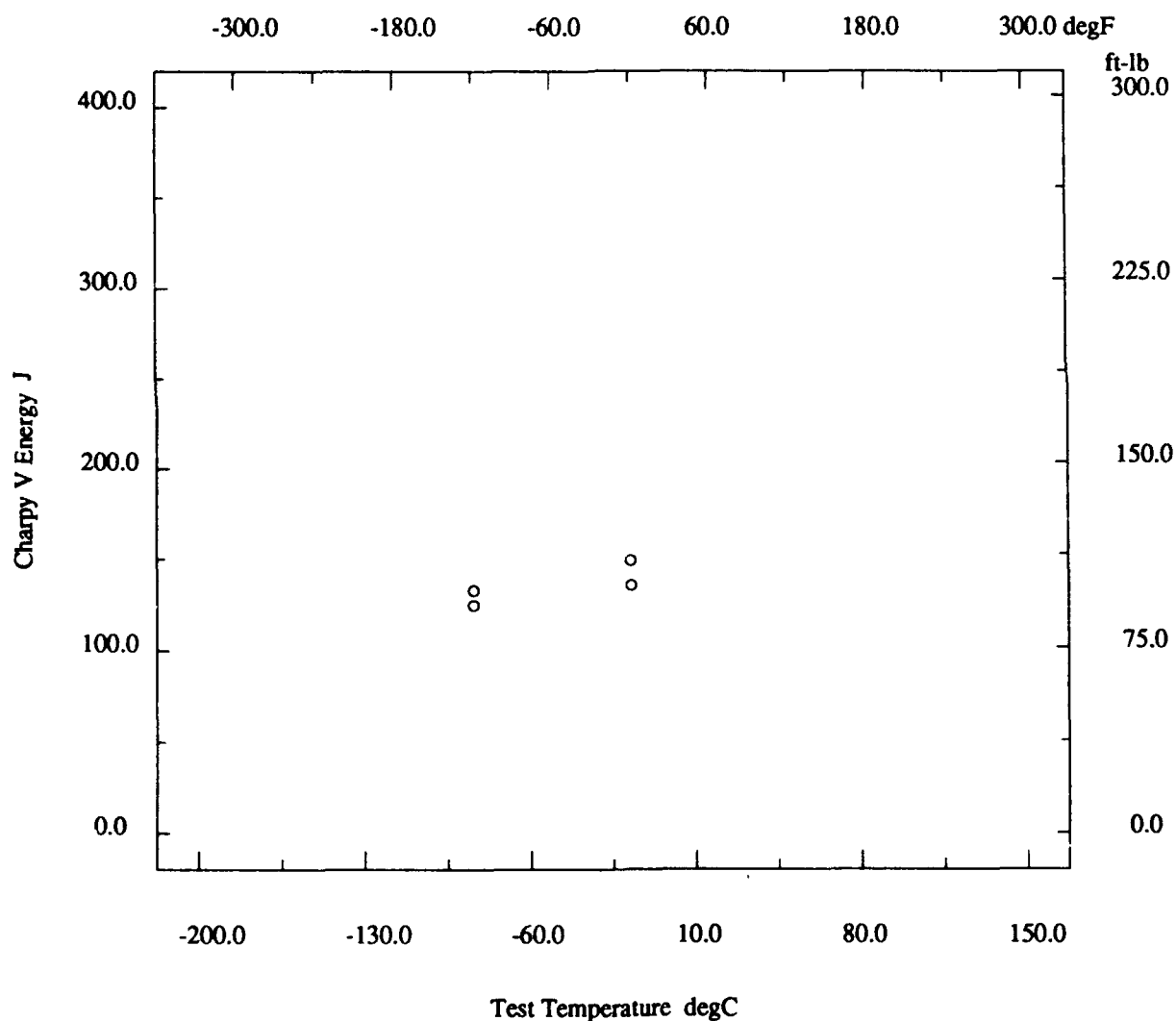


# Marine Structural Toughness Data Bank

**Material HY80**

Page 17900.44

<b>Description</b>			
Material Code	001.015.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.45

<b>Description</b>			
Material Code	001.015.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		
<b>Composition</b>		See Page 17900.1	
<b>Fabrication History</b>		See Page 17900.32	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L ◊	-40	745	*

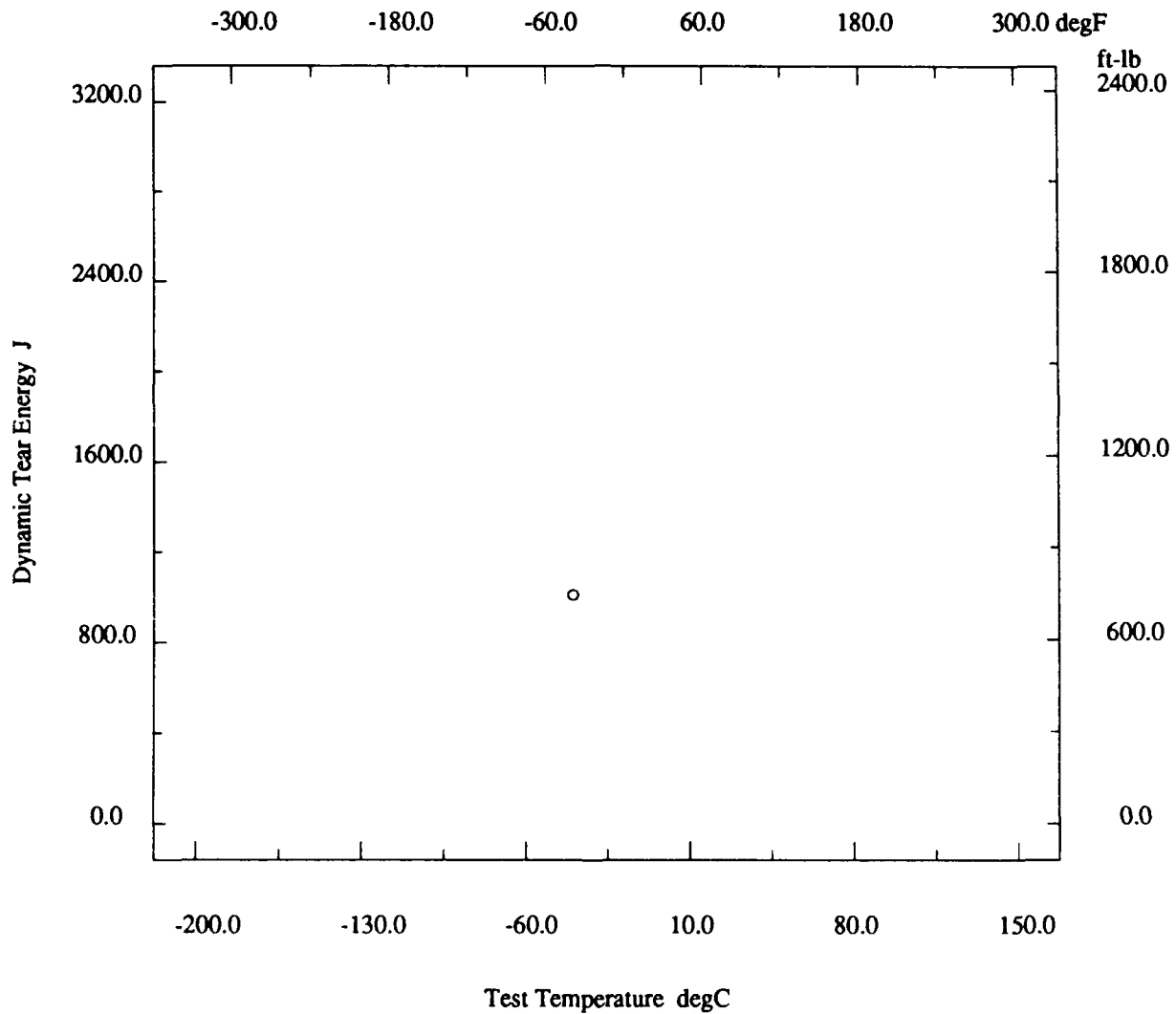
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 17900.46

Description			
Material Code	001.015.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.94 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3710-42B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.1

<b>Description</b>							
Material Code	001.016.01T1	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	1.1 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	DO733-1D				
Reference	USN-1						
<b>Composition</b>							
C	0.15 %	Mn	0.28 %				
P	0.005 %	S	0.019 %				
Si	0.22 %	Cr	1.46 %				
Ni	2.73 %	Mo	0.38 %				
V	0.003 %	Cu	0.18 %				
Cb	*	Ti	0.003 %				
B	*	Al	0.017 %				
N	*	Other Components	As=0.007; Sn=0.014; Sb=0.004 %				
<b>Fabrication History</b>							
Heat Treatment	A, Q, T	Producer	*				
Year Produced	1982	Addl Info	No				
Source	*	Melting Practice	*				
Ingot Position	Top	Killing Process	*				
Process Temperature	1660 degF	Process Time	1.15 hr				
Rolling Conditions	90 %	Final Processing	A, Q, T				
Final Temperature	1180 degF	Final Time	1.55 hr				
Cold Work Strain	*	Aging Temperature	*				
Aging Time	*	Location	*				
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	125.8	113.7	*	18	59.6	

\* - not reported

# Marine Structural Toughness Data Bank

**Material HY80**

Page 18000.2

<b>Description</b>	
Material Code . . . . . 001.016.01T1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 1.1 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . DO733-1D
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 18000.1	
<b>Fabrication History</b> . . . . . See Page 18000.1	
<b>Property Measurements</b>	
Test Type . . . . . Charpy V Impact	Position . . . . . 1/4T
Specimen Type . . . . . Full	Lateral Expansion . . . . . *
Shear Fracture . . . . . *	Did Specimen Fracture? . . . . . Assumed
Did Specimen Split? . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	88
L-T °	-120	90
L-T °	-120	90
L-T °	-120	94
L-T °	-120	94
L-T °	-40	90
L-T °	-40	92
L-T °	-40	93
L-T °	-40	94
L-T °	-40	94
L-T °	0	90
L-T °	0	92
L-T °	0	94
L-T °	0	94
L-T °	0	94
L-T °	32	92
L-T °	32	94
L-T °	32	96
L-T °	32	96
L-T °	32	98
L-T °	70	100
L-T °	70	90
L-T °	70	92
L-T °	70	96
L-T °	70	98
T-L ▲	-120	64
T-L ▲	-120	66
T-L ▲	-120	66
T-L ▲	-120	66
T-L ▲	-120	66
T-L ▲	-40	60
T-L ▲	-40	62
T-L ▲	-40	68

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L ▲	-40	68
T-L ▲	-40	68
T-L ▲	0	70
T-L ▲	0	72
T-L ▲	0	74
T-L ▲	0	76
T-L ▲	0	76
T-L ▲	32	70
T-L ▲	32	70
T-L ▲	32	70
T-L ▲	32	76
T-L ▲	32	76
T-L ▲	70	68
T-L ▲	70	68
T-L ▲	70	68
T-L ▲	70	70
T-L ▲	70	70

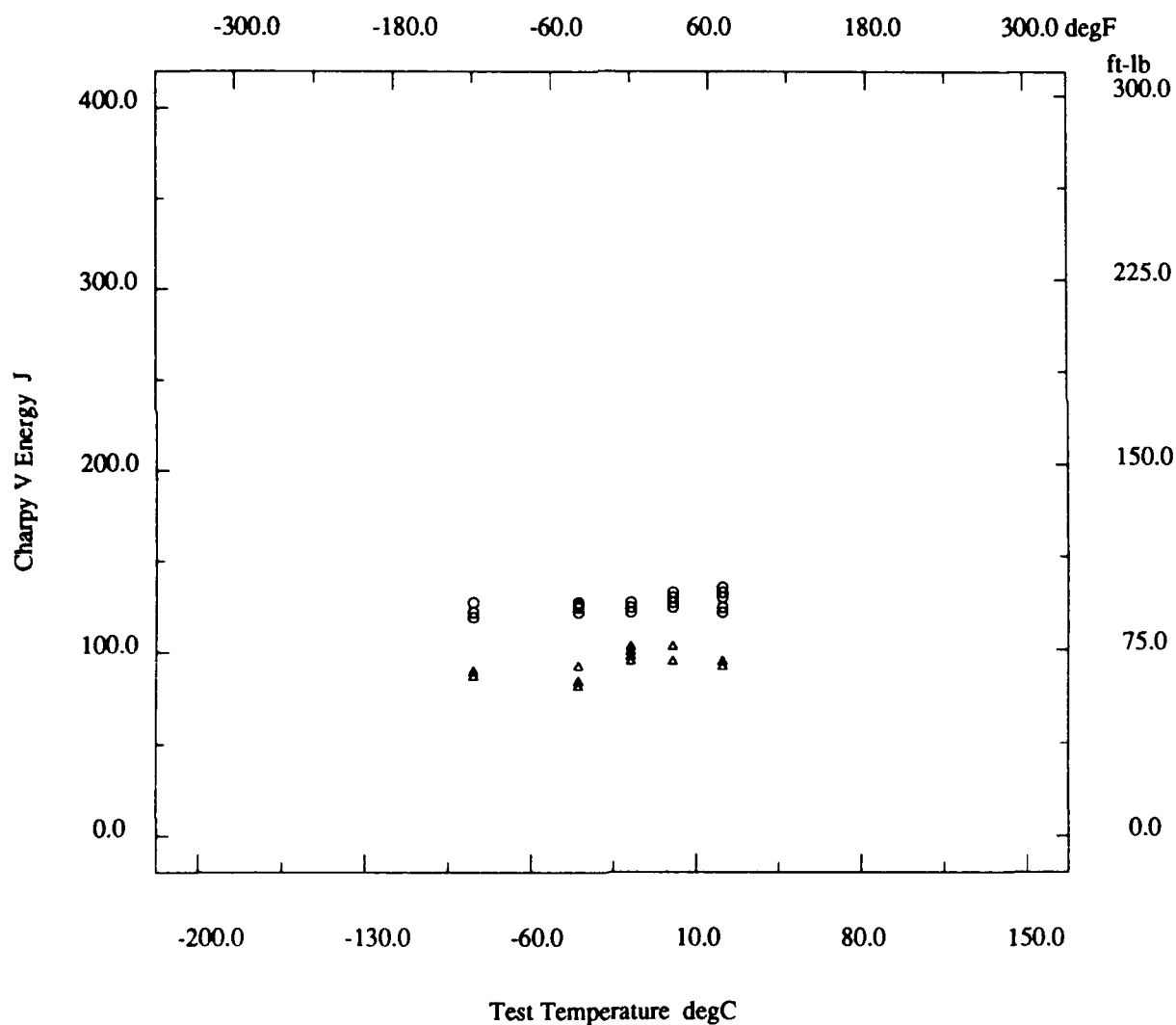
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.4

Description			
Material Code	001.016.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	DO733-1D
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.5

<b>Description</b>	
Material Code	001.016.01T1
UNS	*
Type	Wrought Metal
Thickness	1.1 in
Composition Position	Ladle
Reference	USN-1
Material Name	HY80
Other Designation	*
Form	Plate
Composition Type	Actual
Lot ID	DO733-1D

<b>Composition</b>	See Page 18000.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18000.1
----------------------------	------------------

<b>Property Measurements</b>	
Test Type	Dynamic Tear
Specimen Type	Dynamic Tear
Specimen Thickness	0.625 in
Standard Method	*
Position	1/4T
Notch Preparation	Pressed
Loading Rate	*
Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	525	*

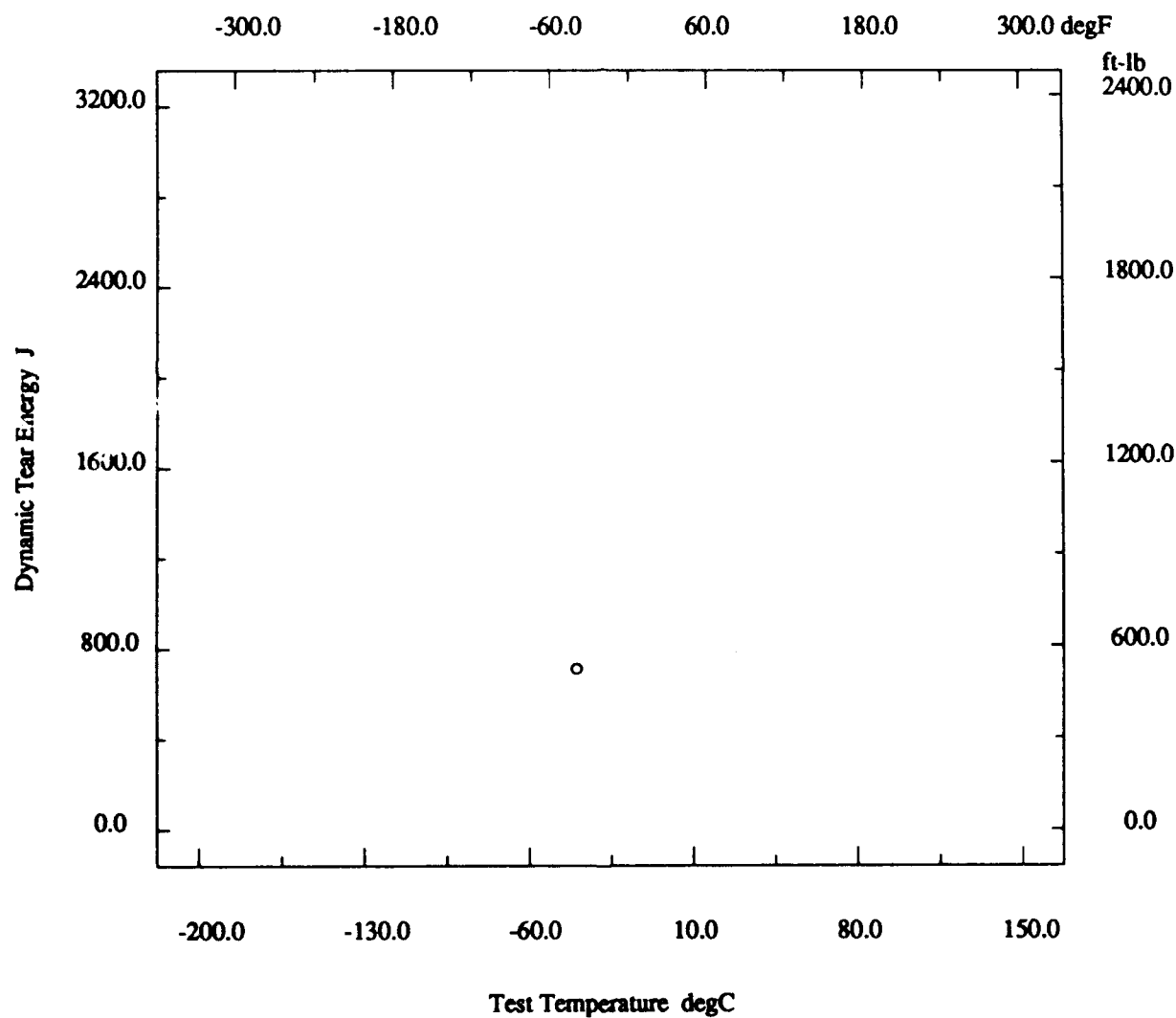


# Marine Structural Toughness Data Bank

Material HY80

Page 18000.6

Description			
Material Code	001.016.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	DO733-1D
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.7

<b>Description</b>	
Material Code . . . . . 001.016.01B2	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 1.1 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . DO733-1D
Reference . . . . . USN-1	
<b>Composition</b> See Page 18000.1	
<b>Fabrication History</b>	
Heat Treatment . . . . . A,Q,T	Producer . . . . . *
Year Produced . . . . . 1982	Addl Info . . . . . No
Source . . . . . *	Melting Practice . . . . . *
Ingot Position . . . . . Bottom	Killing Process . . . . . *
Process Temperature . . . . . 1660 degF	Process Time . . . . . 1.15 hr
Rolling Conditions . . . . . 90 %	Final Processing . . . . . A,Q,T
Final Temperature . . . . . 1180 degF	Final Time . . . . . 1.55 hr
Cold Work Strain . . . . . *	Aging Temperature . . . . . *
Aging Time . . . . . *	Location . . . . . *
<b>Property Measurements</b>	
Test Type . . . . . Tensile	Position . . . . . 1/4T
Specimen Type . . . . . *	Specimen Thickness . . . . . *
Gage Length . . . . . *	Loading Rate . . . . . *
Tensile Strength Offset . . . . . *	Uniform Elongation . . . . . *
Tensile Modulus . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	122.5	110.5	*	20	64.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.8

<b>Description</b>		
Material Code	001.016.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1.1 in	Composition Type
Composition Position	Ladle	Actual
Reference	USN-1	Lot ID
		DO733-1D
<b>Composition</b>		See Page 18000.1
<b>Fabrication History</b>		See Page 18000.7
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

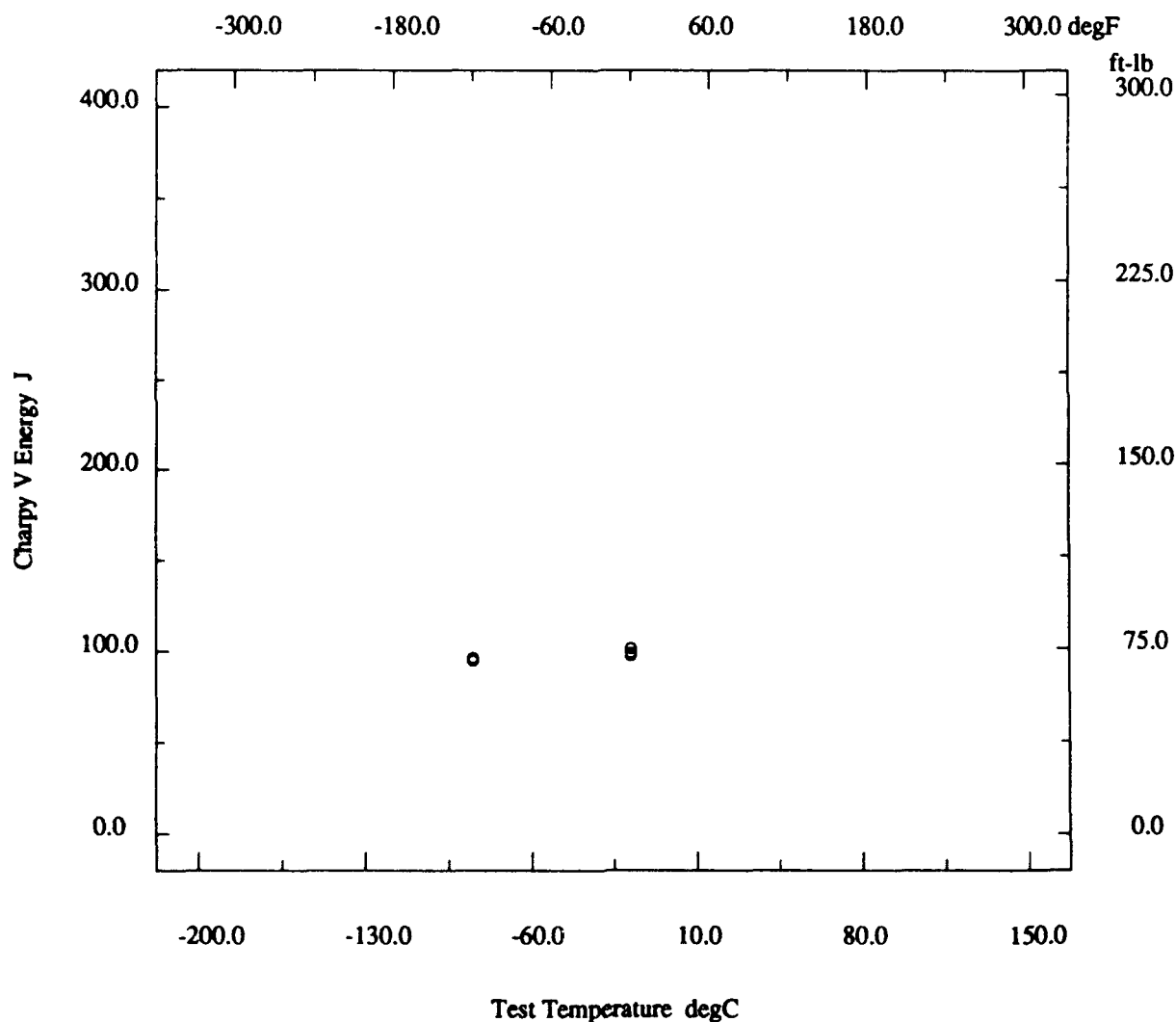
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	70
T-L °	-120	70
T-L °	-120	71
T-L °	0	72
T-L °	0	73
T-L °	0	75

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.9

Description			
Material Code	001.016.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	DO733-1D
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.10

<b>Description</b>			
Material Code	001.016.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	DO733-1D
Reference	USN-1		
<b>Composition</b>		See Page 18000.1	
<b>Fabrication History</b>		See Page 18000.7	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

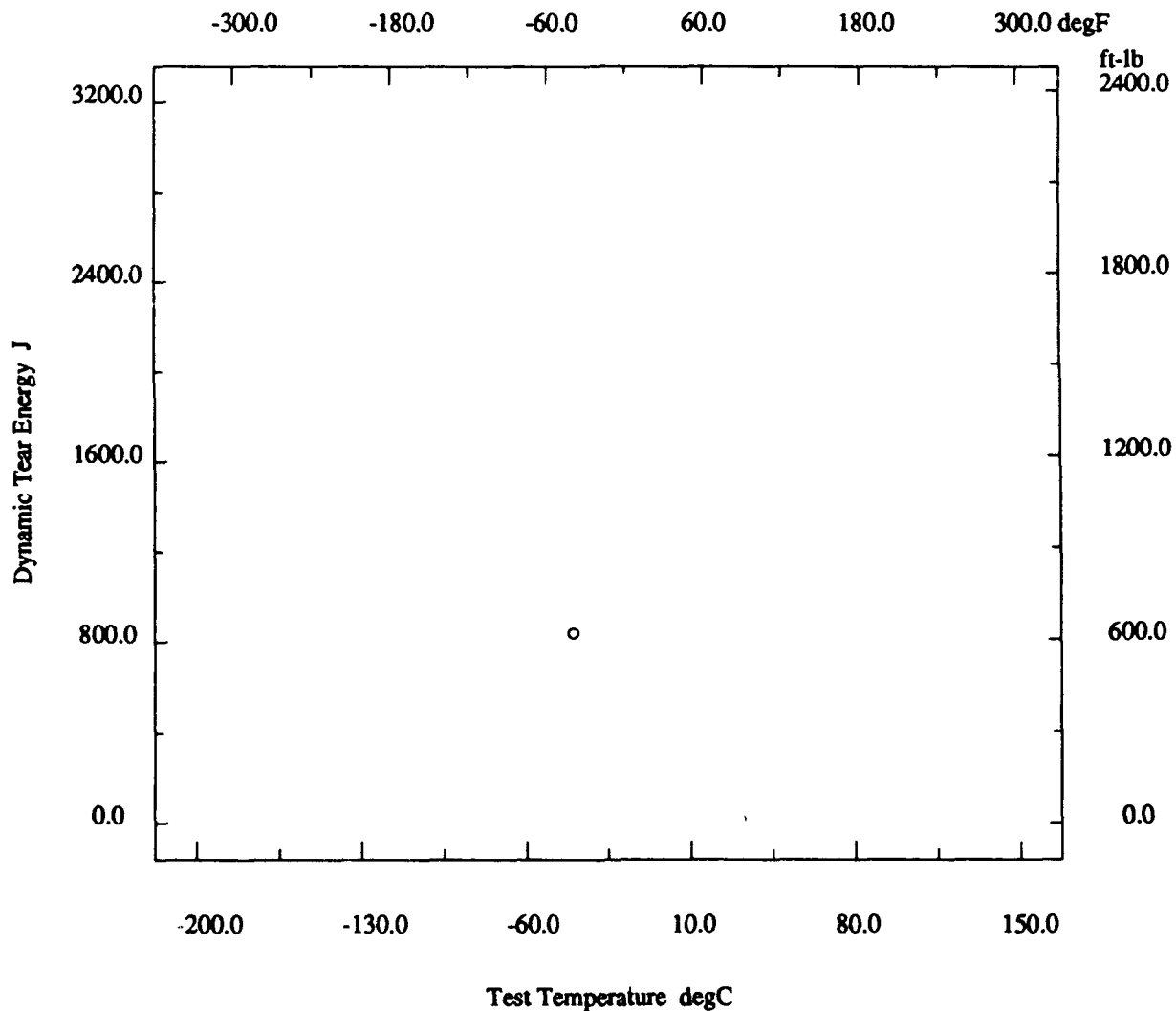
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	620	*

# Marine Structural Toughness Data Bank

Material HY80

Page 18000.11

Description			
Material Code	001.016.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	DO733-1D
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.1

<b>Description</b>						
Material Code	001.017.01T1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1.59 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	N8686-5			
Reference	USN-1					
<b>Composition</b>						
C	0.16 %	Mn	0.25 %			
P	0.007 %	S	0.011 %			
Si	0.27 %	Cr	1.45 %			
Ni	2.73 %	Mo	0.39 %			
V	0.01 %	Cu	0.12 %			
Cb	*	Ti	0.003 %			
B	*	Al	0.021 %			
N	*	Other Components	As=0.01;Sn=0.01;Sb=0.005 %			
<b>Fabrication History</b>						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Top	Killing Process	*			
Process Temperature	1660 degF	Process Time	1.65 hr			
Rolling Conditions	95 %	Final Processing	A,Q,T			
Final Temperature	1160 degF	Final Time	1.55 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	114.2	102.3	*	22	66.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.2

<b>Description</b>	
Material Code .....	001.017.01T1
UNS .....	*
Type .....	Wrought Metal
Thickness .....	1.59 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	N8686-5
<b>Composition</b> See Page 18100.1	
<b>Fabrication History</b> See Page 18100.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	1/4T
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	*

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	110
L-T °	-120	112
L-T °	-120	114
L-T °	-120	116
L-T °	-120	118
L-T °	-40	114
L-T °	-40	116
L-T °	-40	116
L-T °	-40	118
L-T °	-40	120
L-T °	0	100
L-T °	0	110
L-T °	0	116
L-T °	0	120
L-T °	0	120
L-T °	32	118
L-T °	32	119
L-T °	32	120
L-T °	32	120
L-T °	32	121
L-T °	70	124
L-T °	70	124
L-T °	70	125
L-T °	70	126
L-T °	70	126
T-L ▲	-120	72
T-L ▲	-120	72
T-L ▲	-120	73
T-L ▲	-120	74
T-L ▲	-120	76
T-L ▲	-40	80
T-L ▲	-40	80
T-L ▲	-40	82



# Marine Structural Toughness Data Bank

Material HY80

Page 18100.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	84
T-L Δ	-40	86
T-L Δ	0	80
T-L Δ	0	81
T-L Δ	0	82
T-L Δ	0	82
T-L Δ	0	84
T-L Δ	32	78
T-L Δ	32	84
T-L Δ	32	86
T-L Δ	32	88
T-L Δ	32	92
T-L Δ	70	80
T-L Δ	70	84
T-L Δ	70	87
T-L Δ	70	88
T-L Δ	70	90

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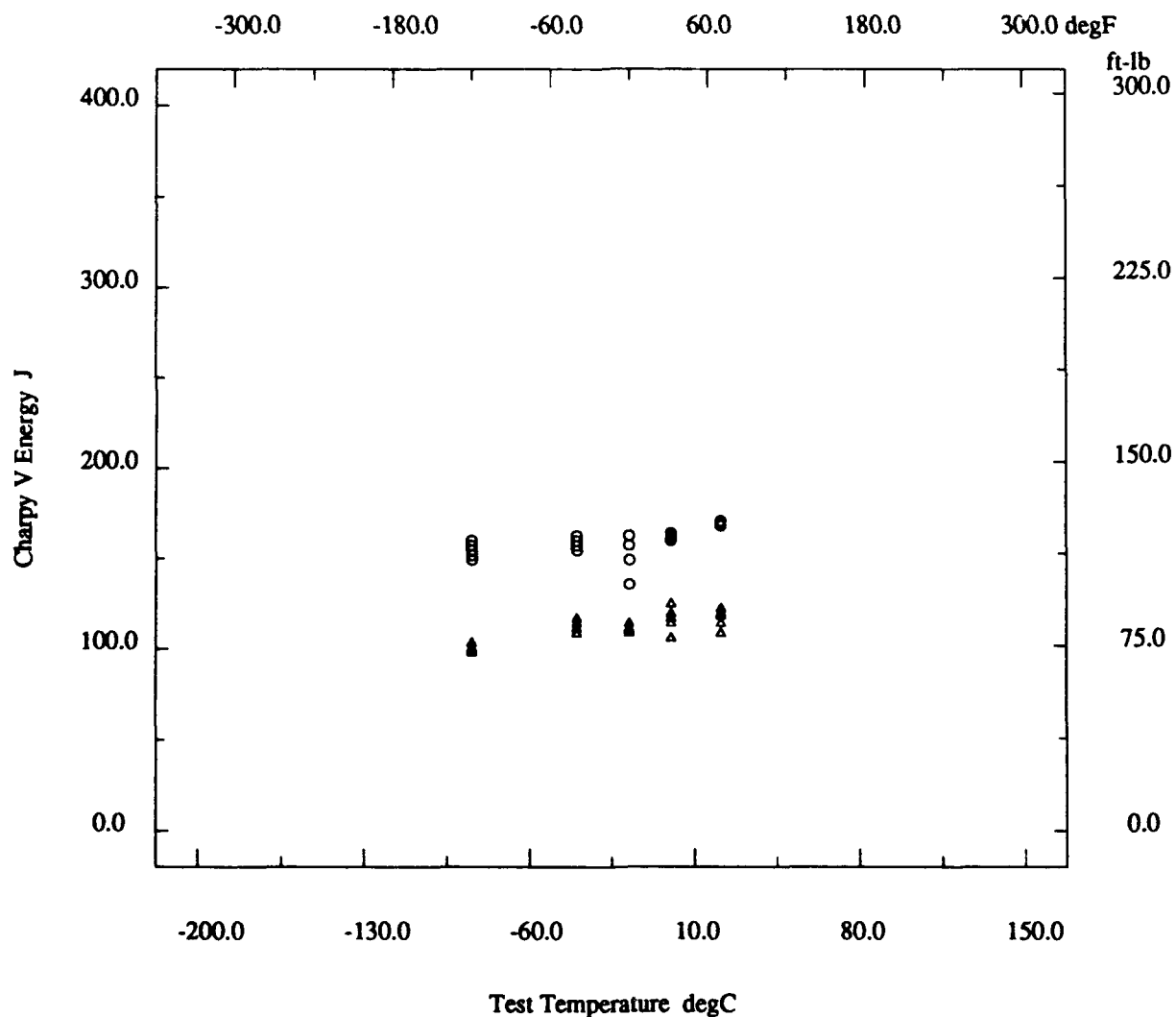
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.4

Description			
Material Code	001.017.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.5

<b>Description</b>			
Material Code	001.017.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		
<b>Composition</b>		See Page 18100.1	
<b>Fabrication History</b>		See Page 18100.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

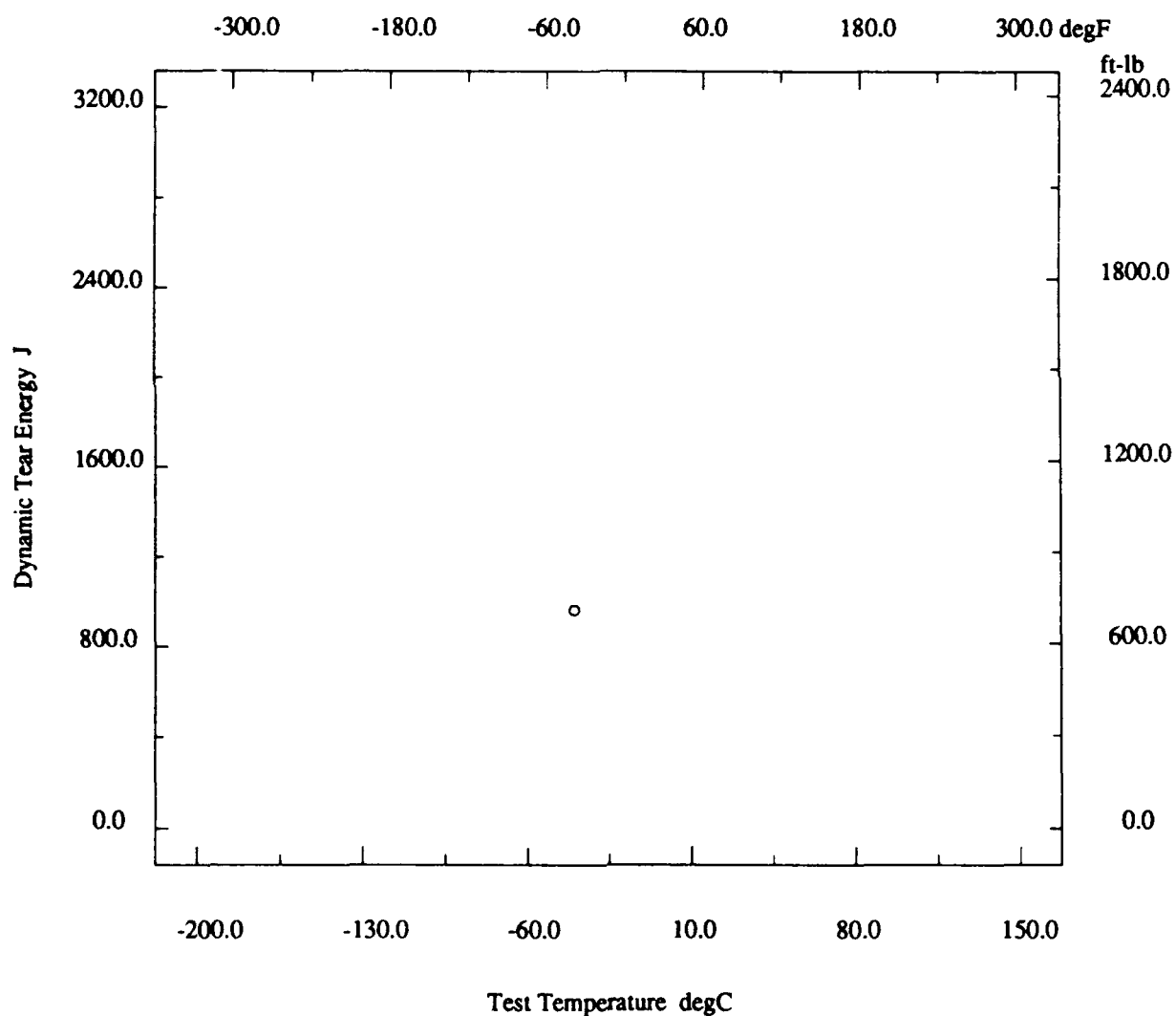
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	710	*

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.6

Description			
Material Code	001.017.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.7

<b>Description</b>			
Material Code	001.017.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		
<b>Composition</b>		See Page 18100.1	
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Bottom	Killing Process	*
Process Temperature	1660 degF	Process Time	1.65 hr
Rolling Conditions	95 %	Final Processing	A,Q,T
Final Temperature	1160 degF	Final Time	1.55 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	117.7	107.0	*	21	64.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.8

<b>Description</b>		
Material Code	001.017.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1.59 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	N8686-5

<b>Composition</b>	See Page 18100.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18100.7
----------------------------	------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

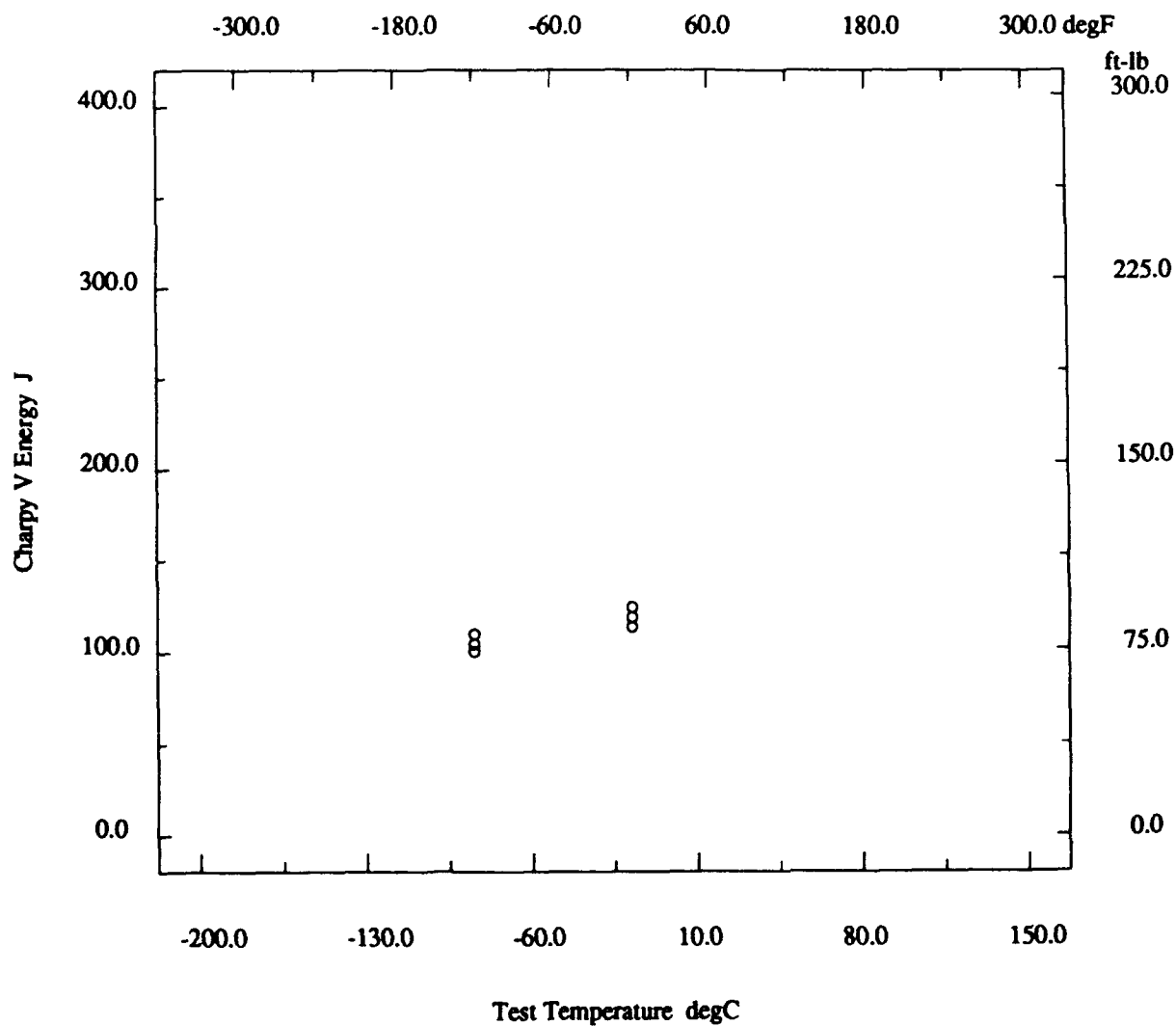
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	74
T-L °	-120	77
T-L °	-120	81
T-L °	0	84
T-L °	0	88
T-L °	0	92

# Marine Structural Toughness Data Bank

**Material HY80**

Page 18100.9

Description			
Material Code	001.017.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18100.10

<b>Description</b>			
Material Code	001.017.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		
<b>Composition</b>		See Page 18100.1	
<b>Fabrication History</b>		See Page 18100.7	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	620	*

\* - not reported

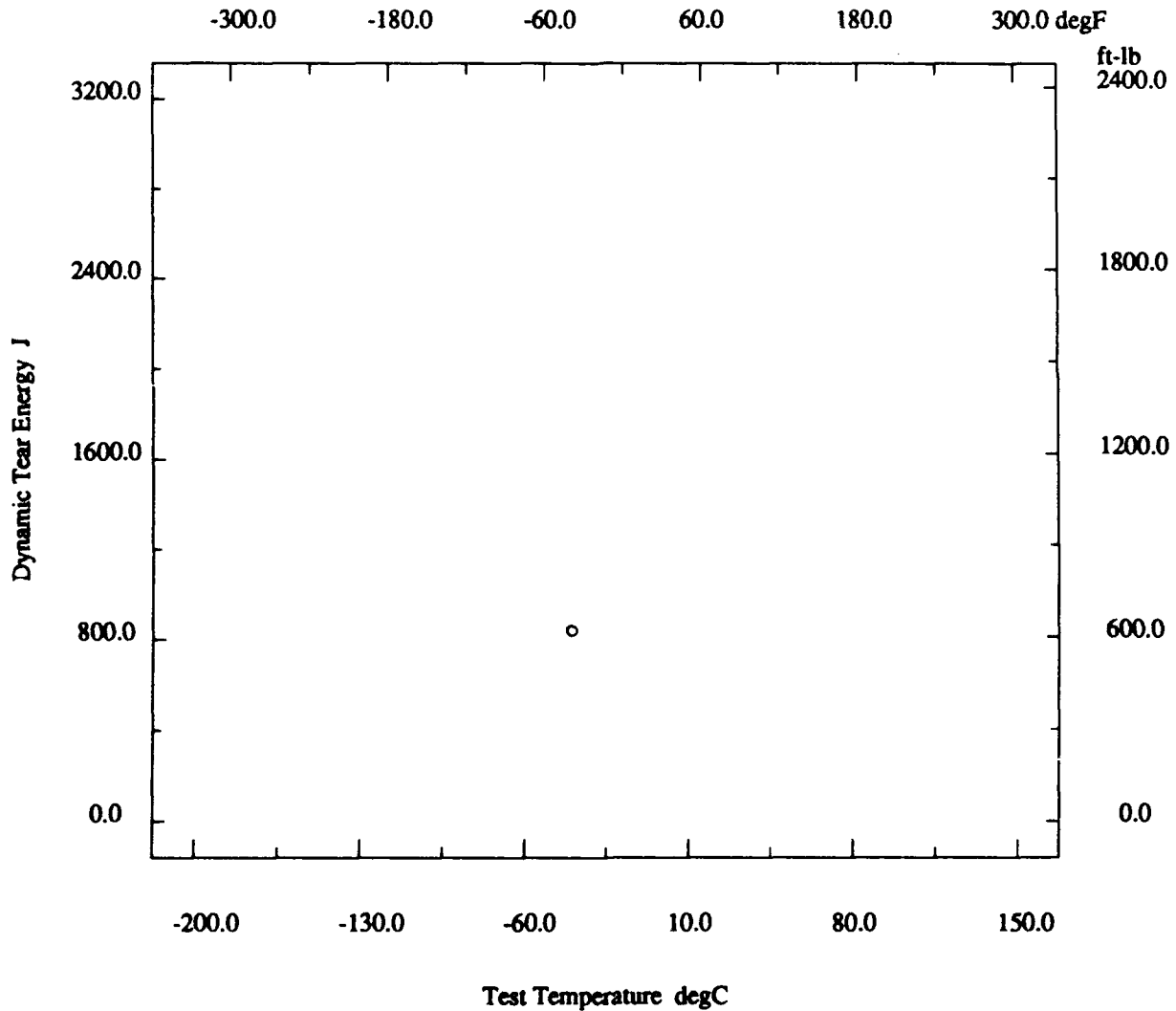


# Marine Structural Toughness Data Bank

Material HY80

Page 18100.11

Description			
Material Code	001.017.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.59 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	N8686-5
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.1

Description						
Material Code	001.018.01T1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3974-1B			
Reference	USN-1					
Composition						
C	0.15 %	Mn	0.31 %			
P	0.013 %	S	0.017 %			
Si	0.22 %	Cr	1.49 %			
Ni	3.10 %	Mo	0.40 %			
V	0.01 %	Cu	0.16 %			
Cb	*	Ti	0.003 %			
B	*	Al	0.026 %			
N	*	Other Components	As=0.006;Sn=0.015;Sb=0.007 %			
Fabrication History						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Top	Killing Process	*			
Process Temperature	1160 degF	Process Time	3.25 hr			
Rolling Conditions	70 %	Final Processing	A,Q,T			
Final Temperature	1660 degF	Final Time	3.48 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
Property Measurements						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	115.5	104.5	*	18	57.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.2

<b>Description</b>		
Material Code	001.018.01T1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3974-1B

**Composition:** See Page 18200.1

**Fabrication History** See Page 18200.1

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	105
L-T °	-120	110
L-T °	-120	110
L-T °	-120	112
L-T °	-120	118
L-T °	-40	102
L-T °	-40	105
L-T °	-40	110
L-T °	-40	111
L-T °	-40	111
L-T °	0	100
L-T °	0	108
L-T °	0	110
L-T °	0	111
L-T °	0	118
L-T °	32	108
L-T °	32	110
L-T °	32	114
L-T °	32	116
L-T °	32	118
L-T °	70	116
L-T °	70	120
L-T °	70	121
L-T °	70	121
L-T °	70	123
T-L ^	-120	40
T-L ^	-120	48
T-L ^	-120	50
T-L ^	-120	66
T-L ^	-120	66
T-L ^	-40	50
T-L ^	-40	50
T-L ^	-40	56

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L Δ	-40	56
T-L Δ	-40	58
T-L Δ	0	60
T-L Δ	0	63
T-L Δ	0	63
T-L Δ	0	68
T-L Δ	0	70
T-L Δ	32	68
T-L Δ	32	68
T-L Δ	32	80
T-L Δ	32	86
T-L Δ	32	88
T-L Δ	70	72
T-L Δ	70	74
T-L Δ	70	78
T-L Δ	70	78
T-L Δ	70	88

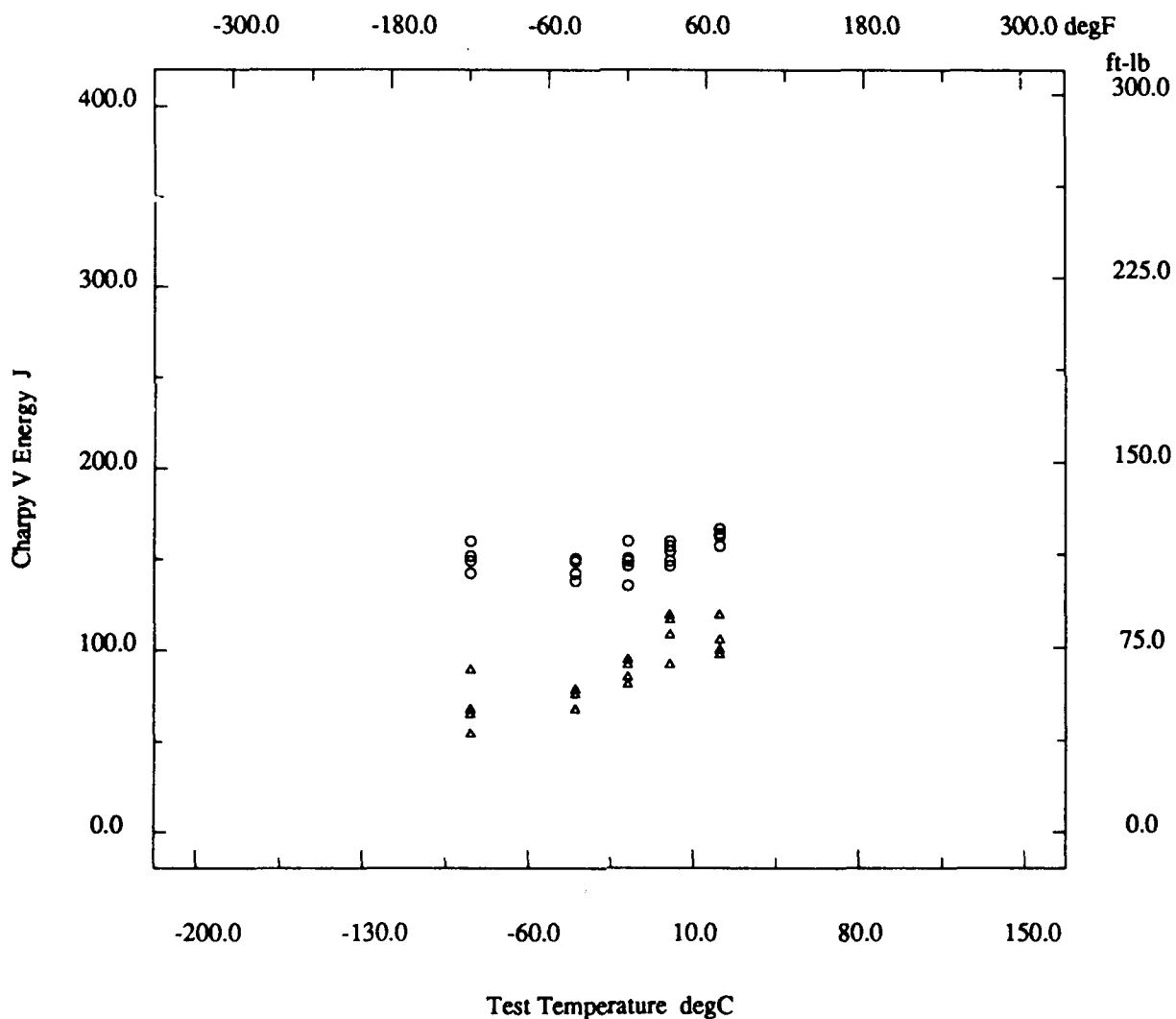
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.4

<b>Description</b>			
Material Code	001.018.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.5

<b>Description</b>						
Material Code .....	001.018.01TM					
UNS .....	*					
Type .....	Wrought Metal					
Thickness .....	2.75 in					
Composition Position .....	Ladle					
Reference .....	USN-1					
<b>Composition</b>						
See Page 18200.1						
<b>Fabrication History</b>						
See Page 18200.1						
<b>Property Measurements</b>						
Test Type .....	Tensile					
Specimen Type .....	*					
Gage Length .....	*					
Tensile Strength Offset .....	*					
Tensile Modulus .....	*					
Standard Year .....	*					
Position .....	1/4T					
Specimen Thickness .....	*					
Loading Rate .....	*					
Uniform Elongation .....	*					
Standard Method .....	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	114.9	103.5	*	18	52.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.6

<b>Description</b>			
Material Code	001.018.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		
<b>Composition</b>		See Page 18200.1	
<b>Fabrication History</b>		See Page 18200.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	66
T-L °	-120	66
T-L °	-120	66
T-L °	0	72
T-L °	0	78
T-L °	0	86

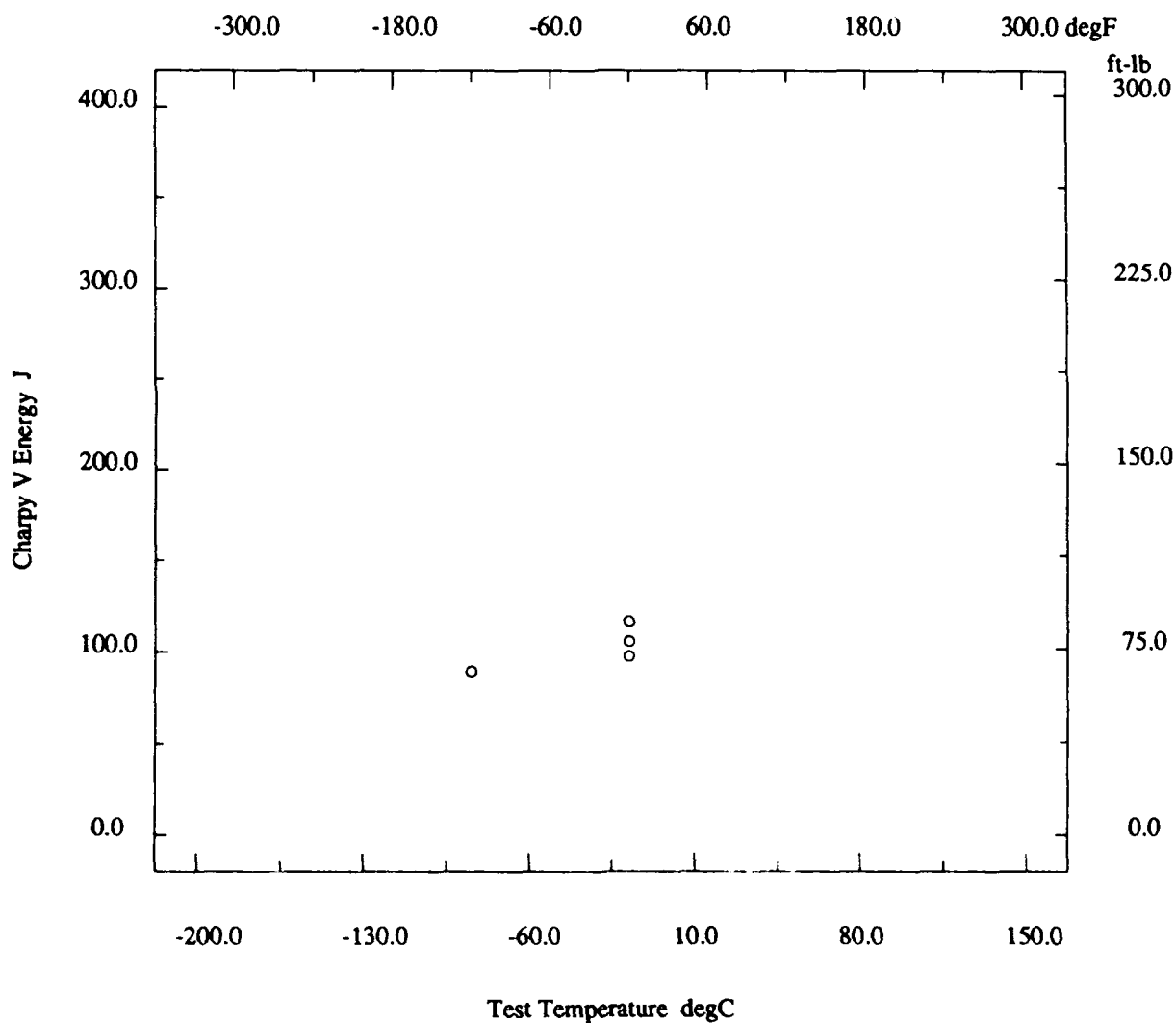
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.7

Description			
Material Code	001.018.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18200.8

<b>Description</b>		
Material Code	001.018.01T2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3974-1B

<b>Composition</b>	See Page 18200.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18200.1
----------------------------	------------------

<b>Property Measurements</b>	
Test Type	Tensile
Specimen Type	*
Gage Length	*
Tensile Strength Offset	*
Tensile Modulus	*
Standard Year	*
Position	1/4T
Specimen Thickness	*
Loading Rate	*
Uniform Elongation	*
Standard Method	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	115.8	102.8	*	20	57.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.9

<b>Description</b>			
Material Code	001.018.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		

<b>Composition</b>	See Page 18200.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18200.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	68
T-L ◦	-120	76
T-L ◦	-120	79
T-L ◦	0	70
T-L ◦	0	79
T-L ◦	0	86

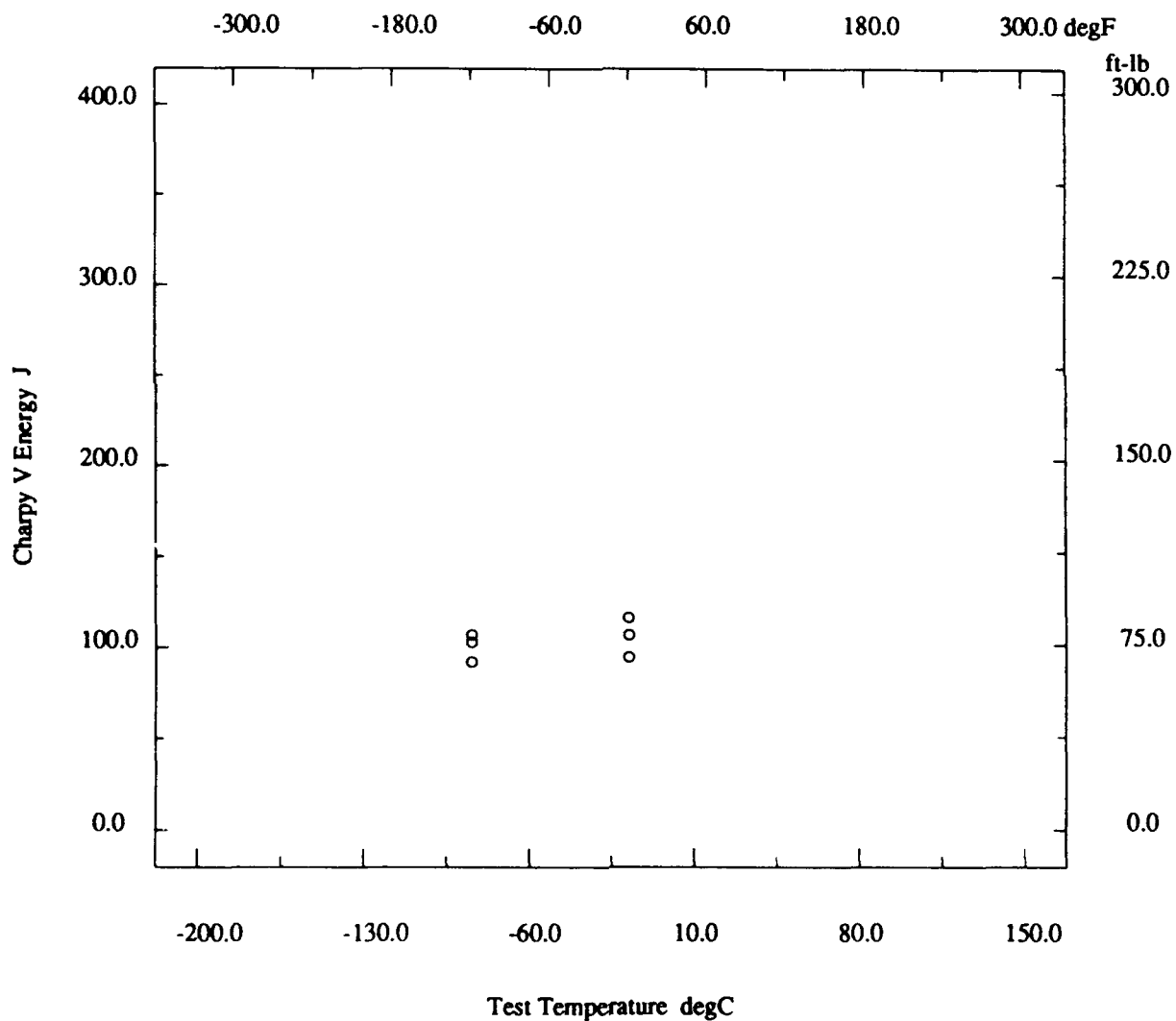
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.10

Description			
Material Code	001.018.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.11

<b>Description</b>	
Material Code .....	001.018.01M1
UNS .....	*
Type .....	Wrought Metal
Thickness .....	2.75 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	D3974-1B
<b>Composition</b>	
See Page 18200.1	
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Year Produced .....	1982
Source .....	*
Ingot Position .....	Mid
Process Temperature .....	1160 degF
Rolling Conditions .....	70 %
Final Temperature .....	1660 degF
Cold Work Strain .....	*
Aging Time .....	*
Producer .....	*
Addl Info .....	No
Melting Practice .....	*
Killing Process .....	*
Process Time .....	3.25 hr
Final Processing .....	A,Q,T
Final Time .....	3.48 hr
Aging Temperature .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Specimen Type .....	*
Gage Length .....	*
Tensile Strength Offset .....	*
Tensile Modulus .....	*
Standard Year .....	*
Position .....	1/4T
Specimen Thickness .....	*
Loading Rate .....	*
Uniform Elongation .....	*
Standard Method .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	115.3	104.7	*	20	60.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.12

<b>Description</b>		
Material Code	001.018.01M1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	

**Composition** See Page 18200.1

**Fabrication History** See Page 18200.11

## Property Measurements

Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	60
T-L ◊	-120	64
T-L ◊	-120	78
T-L ◊	0	60
T-L ◊	0	76
T-L ◊	0	80

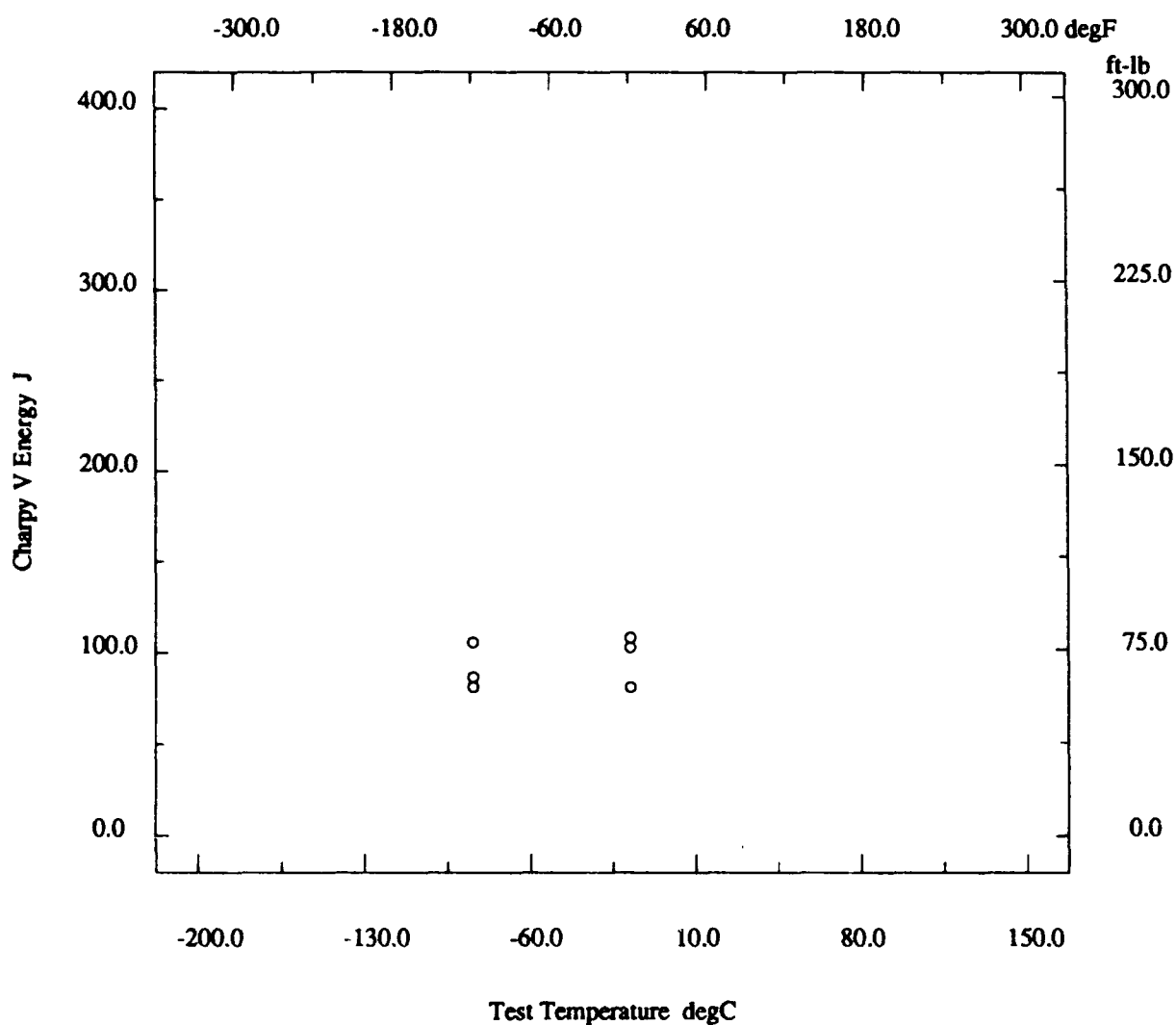
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.13

Description			
Material Code	001.018.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.14

<b>Description</b>						
Material Code	001.018.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3974-1B			
Reference	USN-1					
<b>Composition</b>		See Page 18200.1				
<b>Fabrication History</b>		See Page 18200.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	115.9	105.7	*	18	52.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.15

<b>Description</b>	
Material Code .....	001.018.01MM
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	2.75 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D3974-1B
Reference .....	USN-1
<b>Composition</b>	
See Page 18200.1	
<b>Fabrication History</b>	
See Page 18200.11	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	60
T-L °	-120	61
T-L °	-120	61
T-L °	0	64
T-L °	0	76
T-L °	0	78

\* - not reported

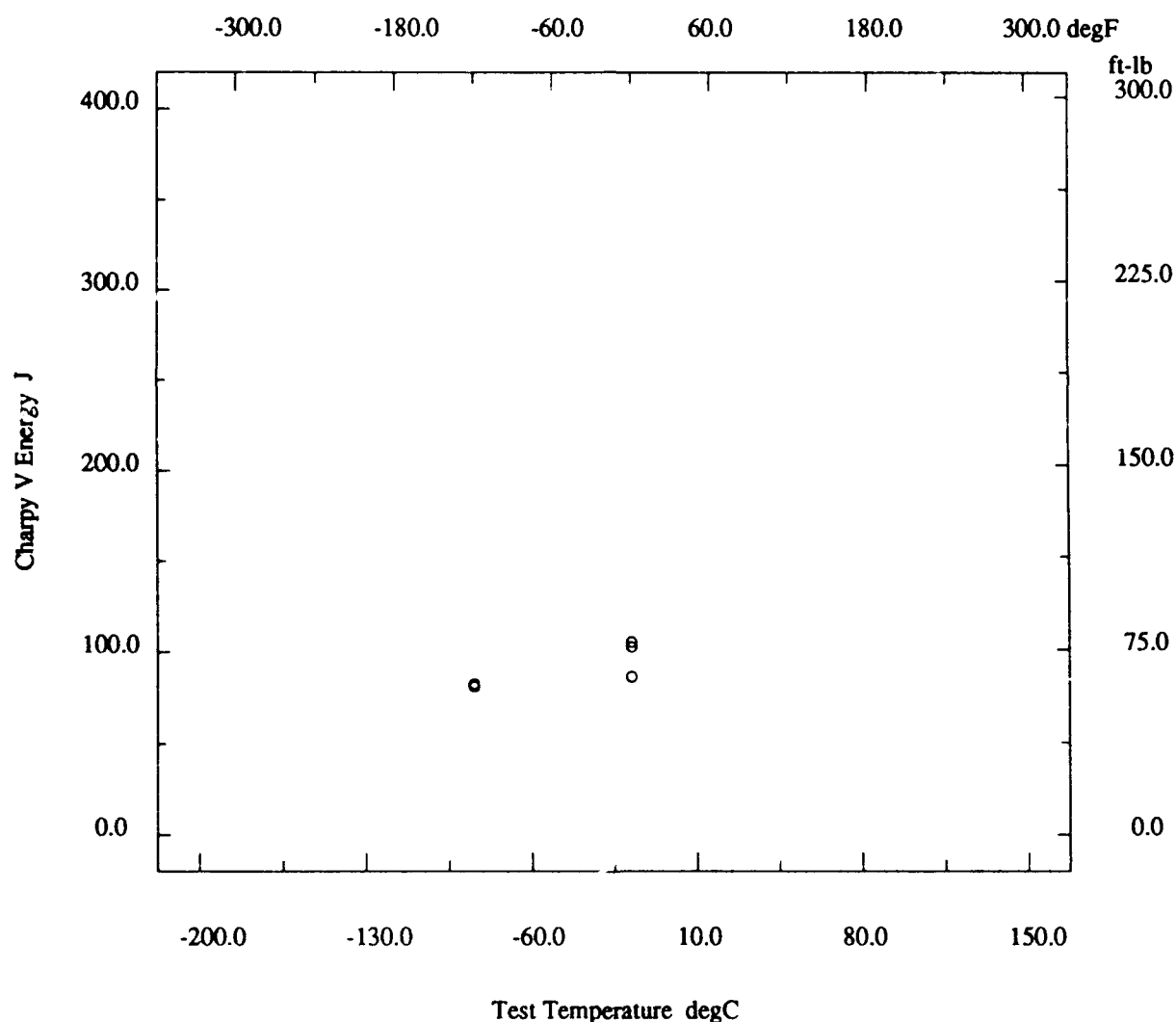


# Marine Structural Toughness Data Bank

Material HY80

Page 18200.16

Description			
Material Code	001.018.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.17

<b>Description</b>						
Material Code	001.018.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3974-1B			
Reference	USN-1					
<b>Composition</b>		See Page 18200.1				
<b>Fabrication History</b>		See Page 18200.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	116.9	106.7	*	18	57.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.18

<b>Description</b>		
Material Code	001.018.01M2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3974-1B

**Composition** See Page 18200.1

**Fabrication History** See Page 18200.11

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L o	-120	64
T-L o	-120	64
T-L o	-120	64
T-L o	0	72
T-L o	0	78
T-L c	0	78

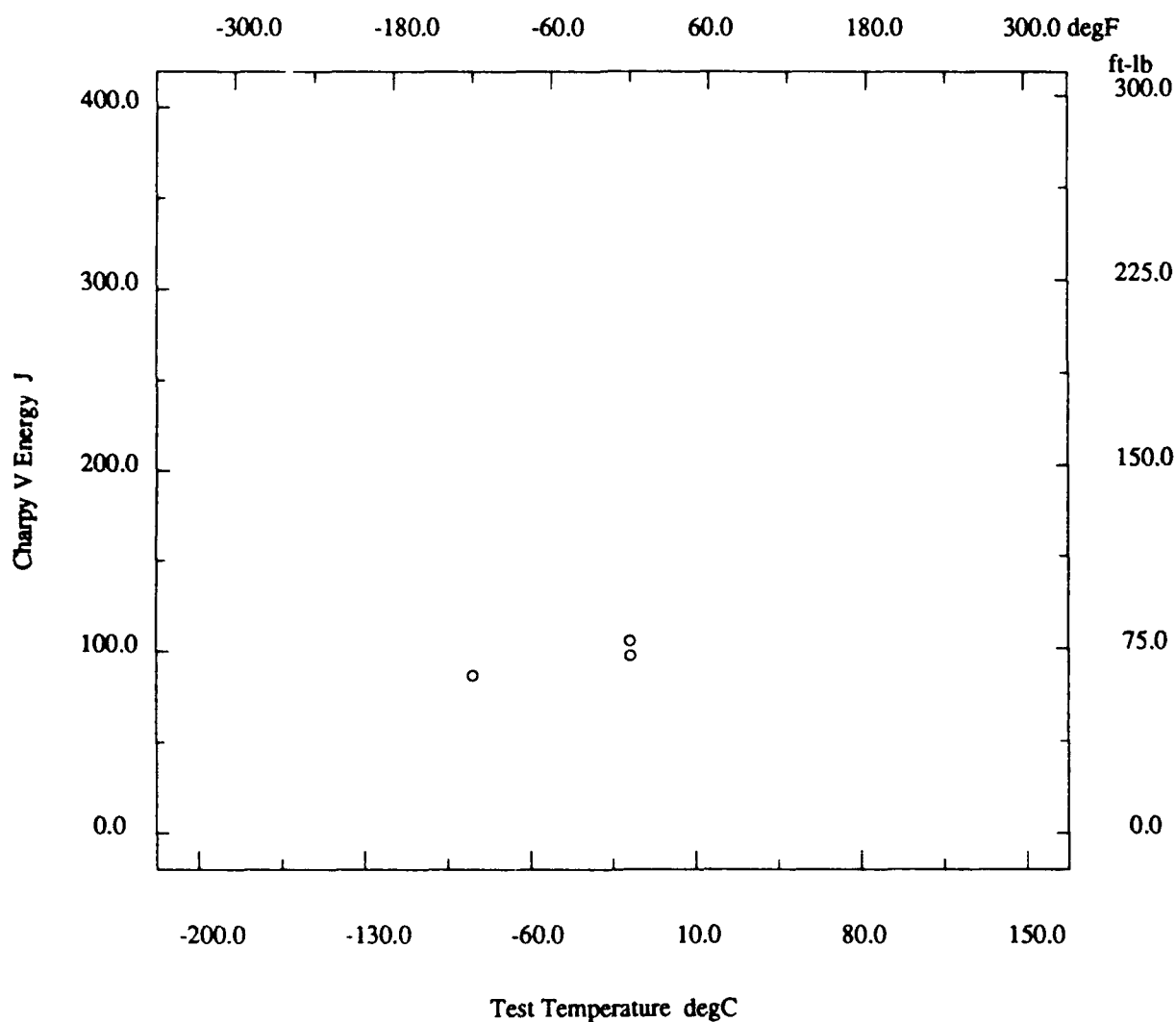
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.19

Description			
Material Code	001.018.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.20

<b>Description</b>	
Material Code .....	001.018.01B1
UNS .....	*
Type .....	Wrought Metal
Thickness .....	2.75 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	D3974-1B
<b>Composition</b>	
See Page 18200.1	
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Year Produced .....	1982
Source .....	*
Ingot Position .....	Bottom
Process Temperature .....	1160 degF
Rolling Conditions .....	70 %
Final Temperature .....	1660 degF
Cold Work Strain .....	*
Aging Time .....	*
Producer .....	*
Addl Info .....	No
Melting Practice .....	*
Killing Process .....	*
Process Time .....	3.25 hr
Final Processing .....	A,Q,T
Final Time .....	3.48 hr
Aging Temperature .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Specimen Type .....	*
Gage Length .....	*
Tensile Strength Offset .....	*
Tensile Modulus .....	*
Standard Year .....	*
Position .....	1/4T
Specimen Thickness .....	*
Loading Rate .....	*
Uniform Elongation .....	*
Standard Method .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	116.8	106.5	*	20	60.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.21

<b>Description</b>		
Material Code	001.018.01B1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3974-1B

<b>Composition</b>	See Page 18200.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18200.20
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	52
T-L °	-120	54
T-L °	-120	58
T-L °	0	63
T-L °	0	69
T-L °	0	69

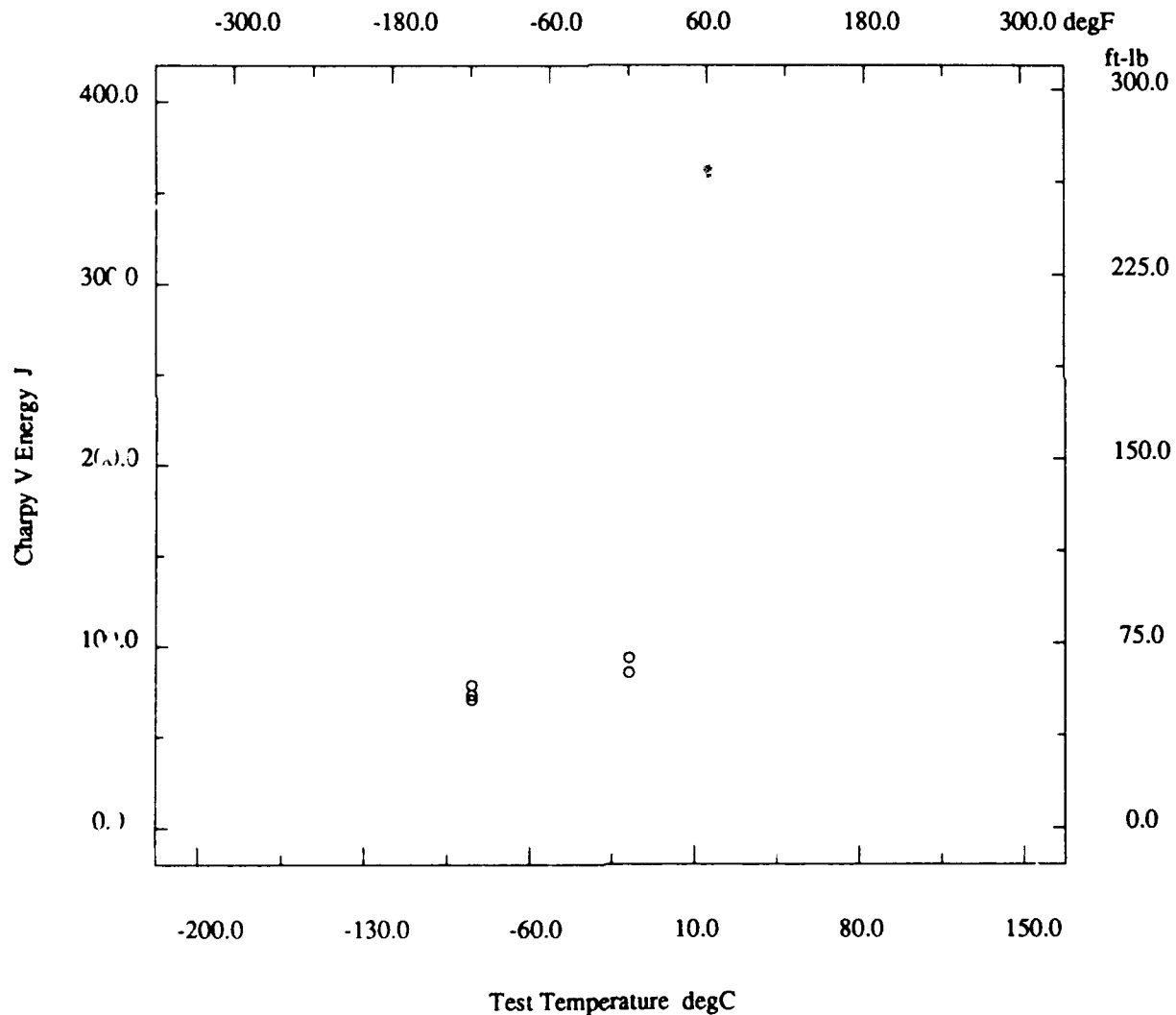
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.22

Description			
Material Code	001.018.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.23

<b>Description</b>						
Material Code	001.018.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D3974-1B			
Reference	USN-1					
<b>Composition</b>		See Page 18200.1				
<b>Fabrication History</b>		See Page 18200.20				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	117.0	106.4	*	19	64.3

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18200.24

<b>Description</b>	
Material Code .....	001.018.01BM
UNS .....	*
Type .....	Wrought Metal
Thickness .....	2.75 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	D3974-1B
<b>Composition</b>	
See Page 18200.1	
<b>Fabrication History</b>	
See Page 18200.20	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	1/4T
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	64
T-L ◦	-120	66
T-L ◦	-120	70
T-L ◦	0	68
T-L ◦	0	69
T-L ◦	0	72

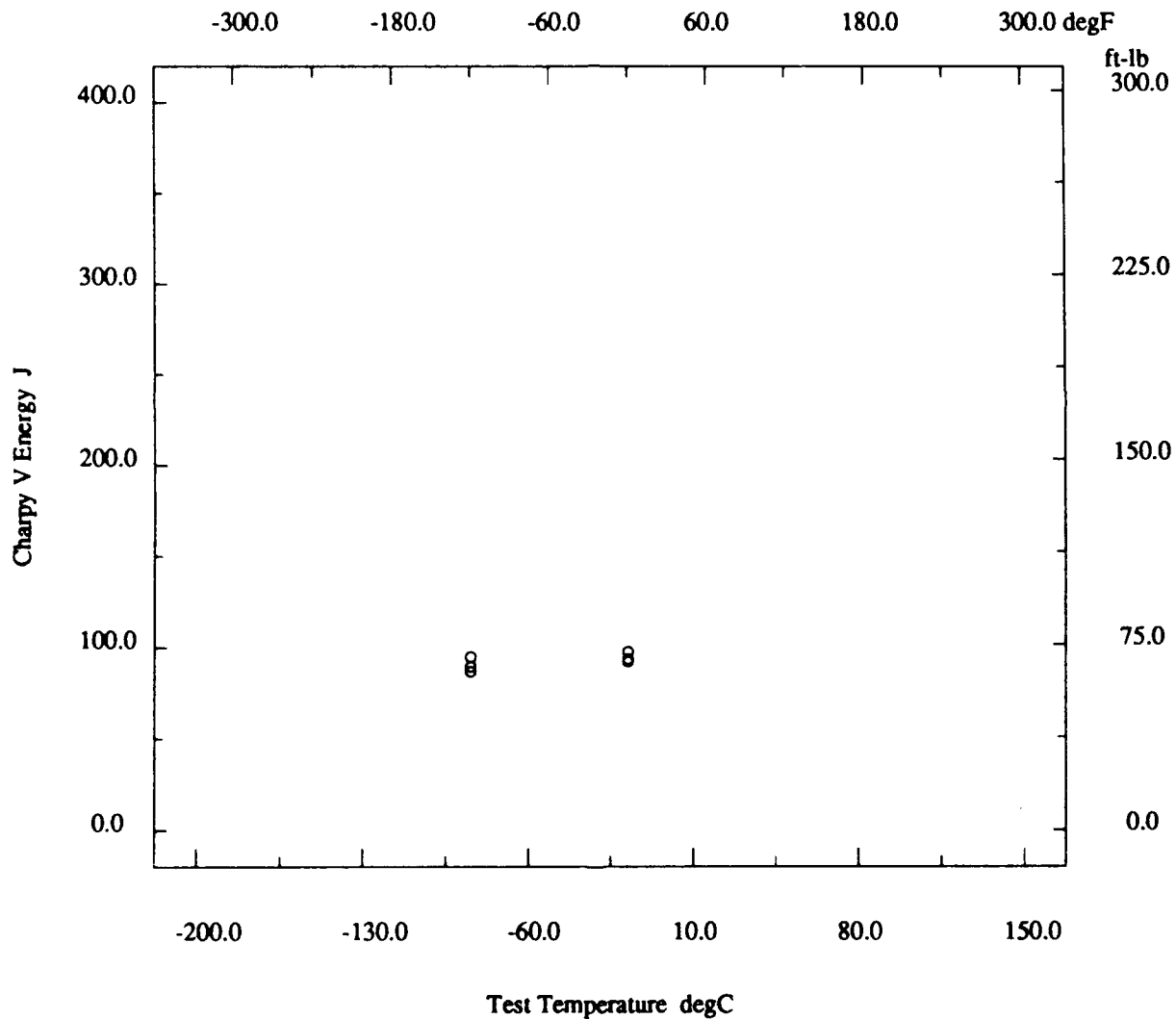
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.25

Description			
Material Code	001.018.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.26

<b>Description</b>						
Material Code		001.018.01B2		Material Name		HY80
UNS		*		Other Designation		*
Type		Wrought Metal		Form		Plate
Thickness		2.75 in		Composition Type		Actual
Composition Position		Ladle		Lot ID		D3974-1B
Reference		USN-1				
<b>Composition</b>				See Page 18200.1		
<b>Fabrication History</b>				See Page 18200.20		
<b>Property Measurements</b>						
Test Type		Tensile		Position		1/4T
Specimen Type		*		Specimen Thickness		*
Gage Length		*		Loading Rate		*
Tensile Strength Offset		*		Uniform Elongation		*
Tensile Modulus		*		Standard Method		*
Standard Year		*				
<b>Orient</b>	<b>Test Temp</b>	<b>UTS</b>	<b>TYS</b>	<b>TYP</b>	<b>Elongation</b>	<b>RA</b>
	degF	ksi	ksi	ksi	%	%
T	Room	117.7	107.0	*	18	62.1

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.27

<b>Description</b>		
Material Code	001.018.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	2.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D3974-1B

<b>Composition</b>	See Page 18200.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18200.20
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	56
T-L °	-120	60
T-L °	-120	70
T-L °	0	73
T-L °	0	79
T-L °	0	80

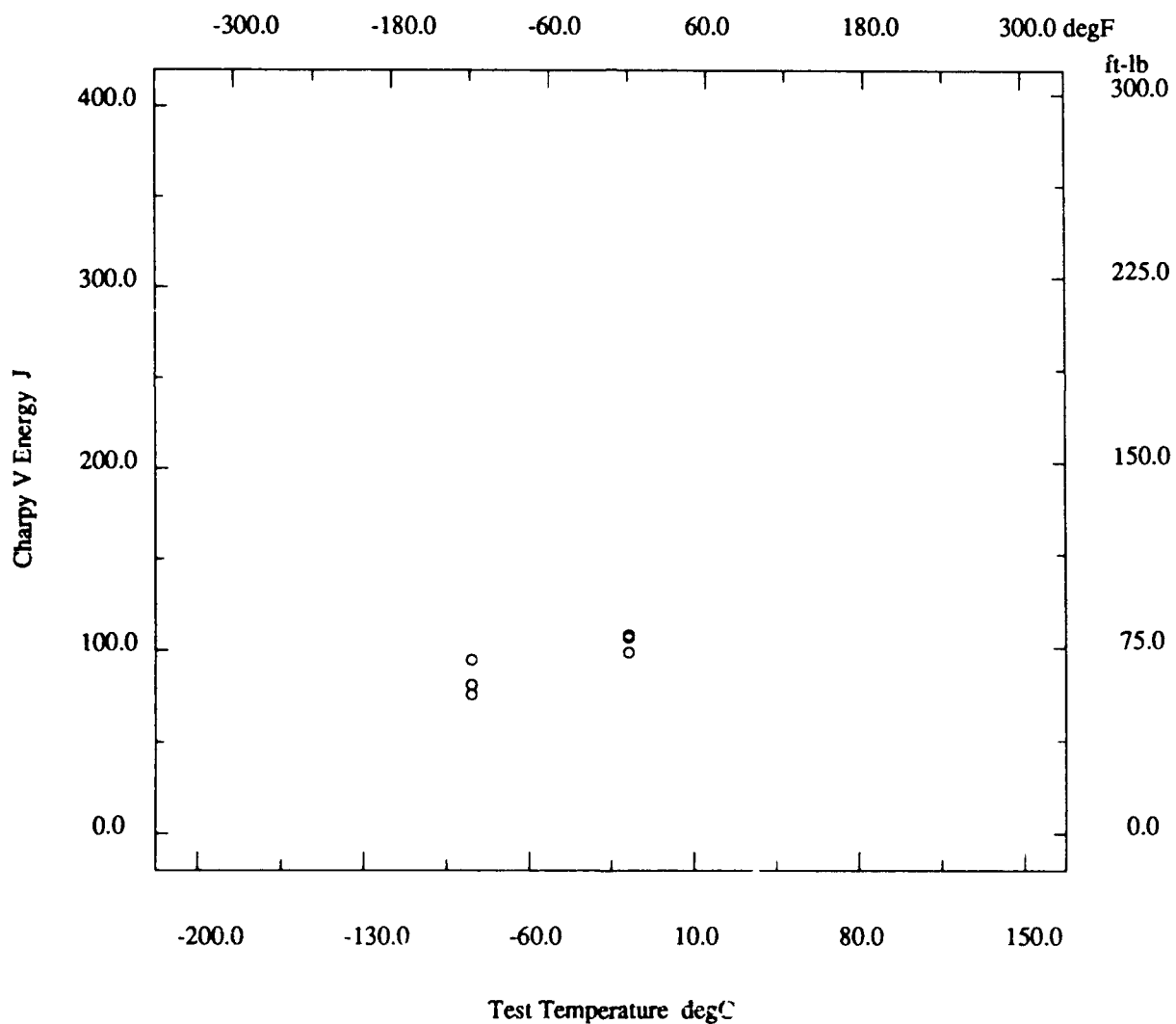
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18200.28

Description			
Material Code	001.018.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D3974-1B
Reference	USN-1		



# Marine Structural Toughness Data Bank

Material HY80

Page 18300.1

<b>Description</b>			
Material Code	001.019.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		
<b>Composition</b>			
C	0.16 %	Mn	0.26 %
P	0.013 %	S	0.006 %
Si	0.25 %	Cr	1.64 %
Ni	3.29 %	Mo	0.54 %
V	0.009 %	Cu	0.13 %
Cb	*	Ti	0.004 %
B	*	Al	0.026 %
N	*	Other Components	As=0.009;Sn=0.013;Sb=0.006 %
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Top	Killing Process	*
Process Temperature	1650 degF	Process Time	6 hr
Rolling Conditions	66 %	Final Processing	A,Q,T
Final Temperature	1160 degF	Final Time	5 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	117.3	104.7	*	22	73.1

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.2

<b>Description</b>		
Material Code	001.019.01T1	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	4 in	Composition Type Actual
Composition Position	Ladle	Lot ID D4030-4A
Reference	USN-1	
<b>Composition</b>		See Page 18300.1
<b>Fabrication History</b>		See Page 18300.1
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	114
L-T °	-120	116
L-T °	-120	118
L-T °	-120	120
L-T °	-120	122
L-T °	-40	126
L-T °	-40	128
L-T °	-40	128
L-T °	-40	130
L-T °	-40	132
L-T °	0	134
L-T °	0	138
L-T °	0	138
L-T °	0	140
L-T °	0	140
L-T °	32	140
L-T °	32	144
L-T °	32	144
L-T °	32	146
L-T °	32	148
L-T °	70	148
L-T °	70	152
L-T °	70	154
L-T °	70	154
L-T °	70	156
T-L △	-120	82
T-L △	-120	86
T-L △	-120	88
T-L △	-120	90
T-L △	-120	90
T-L △	-40	100
T-L △	-40	102
T-L △	-40	104

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L *	-40	96
T-L *	-40	98
T-L *	0	112
T-L *	0	116
T-L *	0	116
T-L *	0	118
T-L *	0	118
T-L *	32	120
T-L *	32	122
T-L *	32	122
T-L *	32	124
T-L *	32	126
T-L *	70	122
T-L *	70	126
T-L *	70	128
T-L *	70	128
T-L *	70	130

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\* - not reported

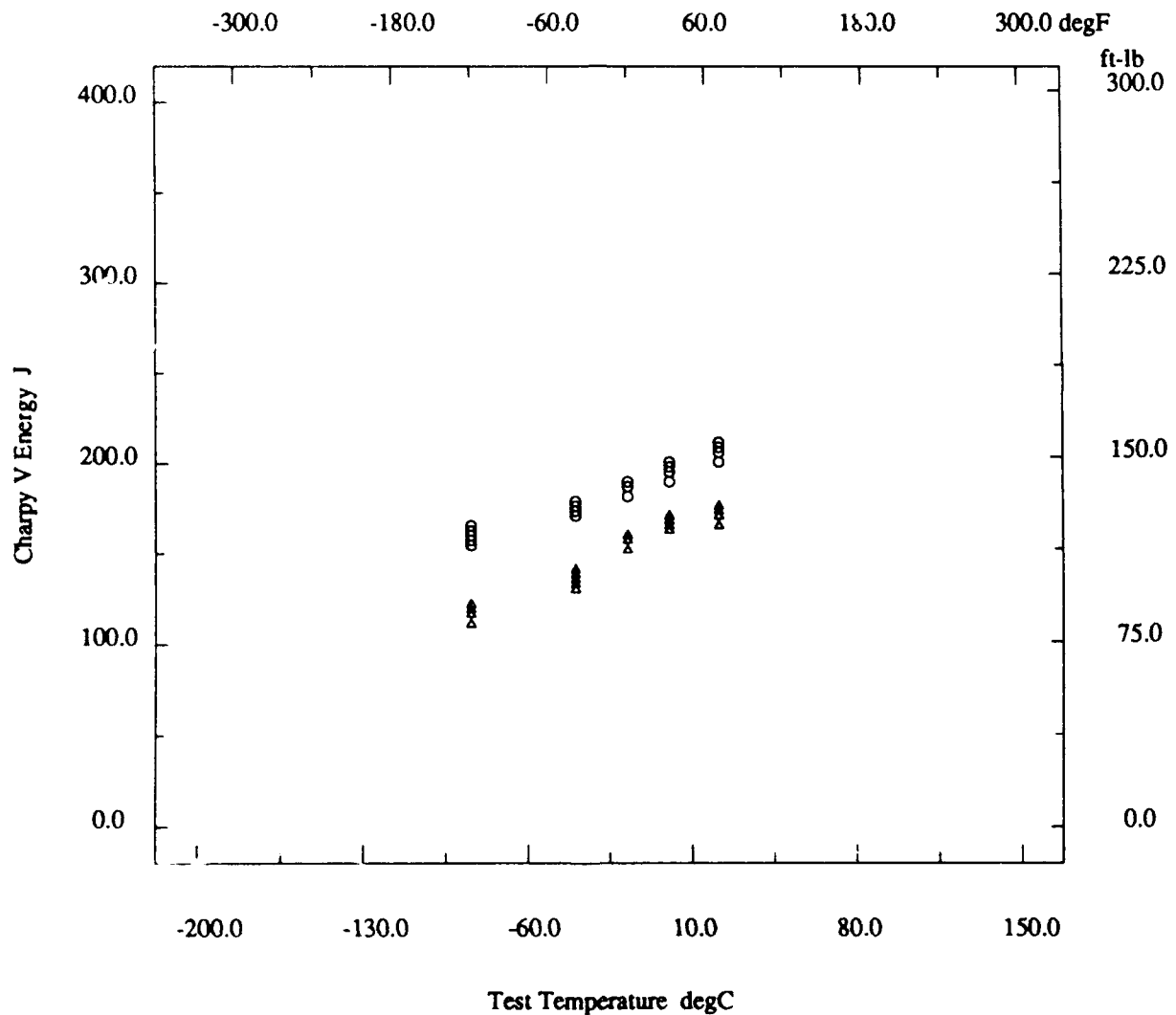


# Marine Structural Toughness Data Bank

Material HY80

Page 18300.4

Description			
Material Code	001.019.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.5

<b>Description</b>			
Material Code	001.019.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	565	*

\* - not reported

# Marine Structural Toughness Data Bank

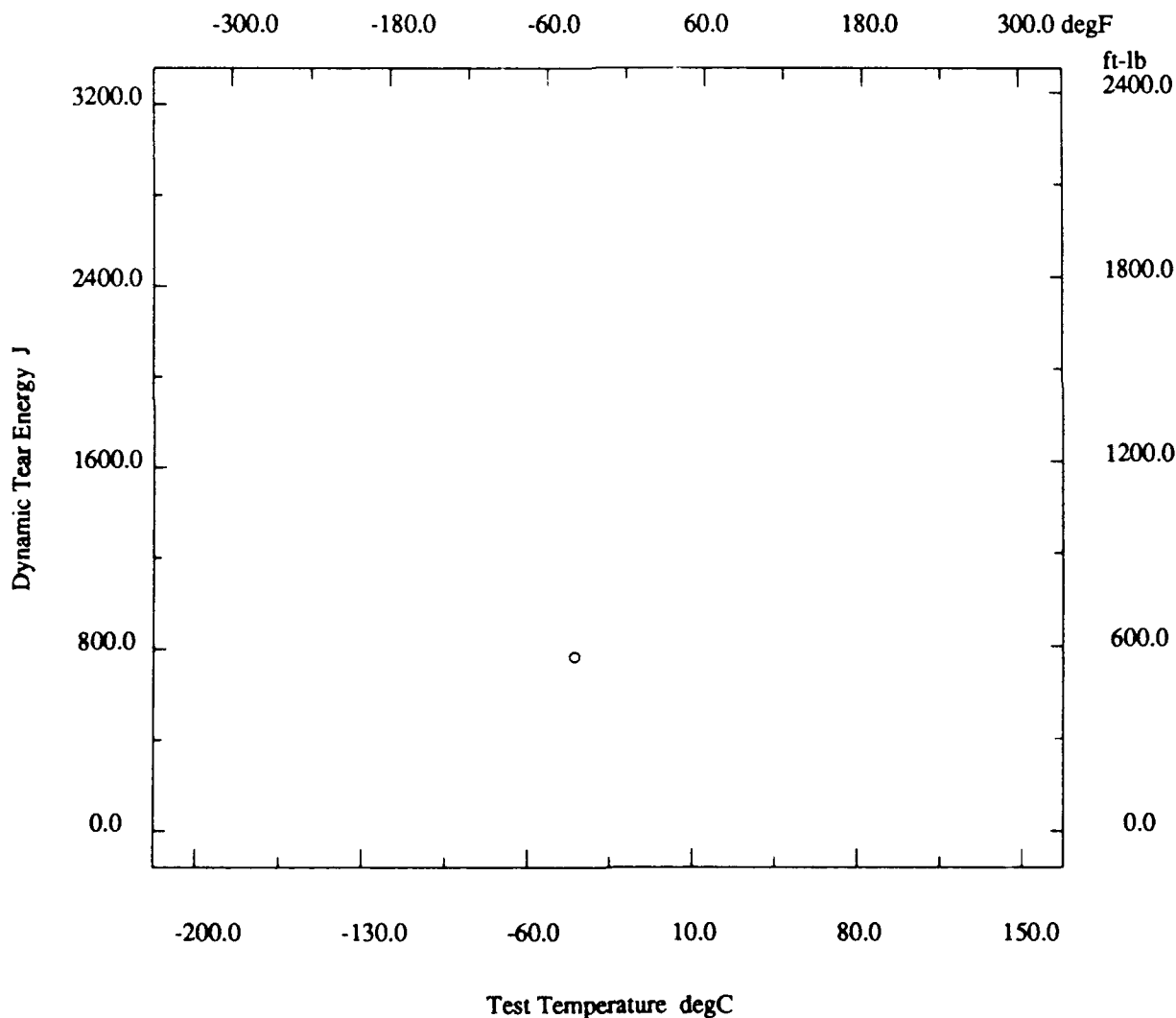
Material HY80

Page 18300.6

## Description

Material Code ..... 001.019.01T1  
UNS ..... \*  
Type ..... Wrought Metal  
Thickness ..... 4 in  
Composition Position ..... Ladle  
Reference ..... USN-1

Material Name ..... HY80  
Other Designation ..... \*  
Form ..... Plate  
Composition Type ..... Actual  
Lot ID ..... D4030-4A



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.7

<b>Description</b>							
Material Code	001.019.01TM	Material Name	HY80				
UNS	*	Other Designation	*				
Type	Wrought Metal	Form	Plate				
Thickness	4 in	Composition Type	Actual				
Composition Position	Ladle	Lot ID	D4030-4A				
Reference	USN-1						
<b>Composition</b>		See Page 18300.1					
<b>Fabrication History</b>		See Page 18300.1					
<b>Property Measurements</b>							
Test Type	Tensile	Position	1/4T				
Specimen Type	*	Specimen Thickness	*				
Gage Length	*	Loading Rate	*				
Tensile Strength Offset	*	Uniform Elongation	*				
Tensile Modulus	*	Standard Method	*				
Standard Year	*						
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %	
T	Room	120.2	107.0	*	20	64.1	

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.8

<b>Description</b>	
Material Code	001.019.01TM
UNS	*
Type	Wrought Metal
Thickness	4 in
Composition Position	1 adle
Reference	USN-1
Material Name	HY80
Other Designation	*
Form	Plate
Composition Type	Actual
Lot ID	D4030-4A

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.1
----------------------------	------------------

<b>Property Measurements</b>	
Test Type	Charpy V Impact
Specimen Type	Full
Shear Fracture	*
Did Specimen Split?	*
Standard Year	*
Position	1/4T
Lateral Expansion	*
Did Specimen Fracture?	Assumed
Standard Method	*

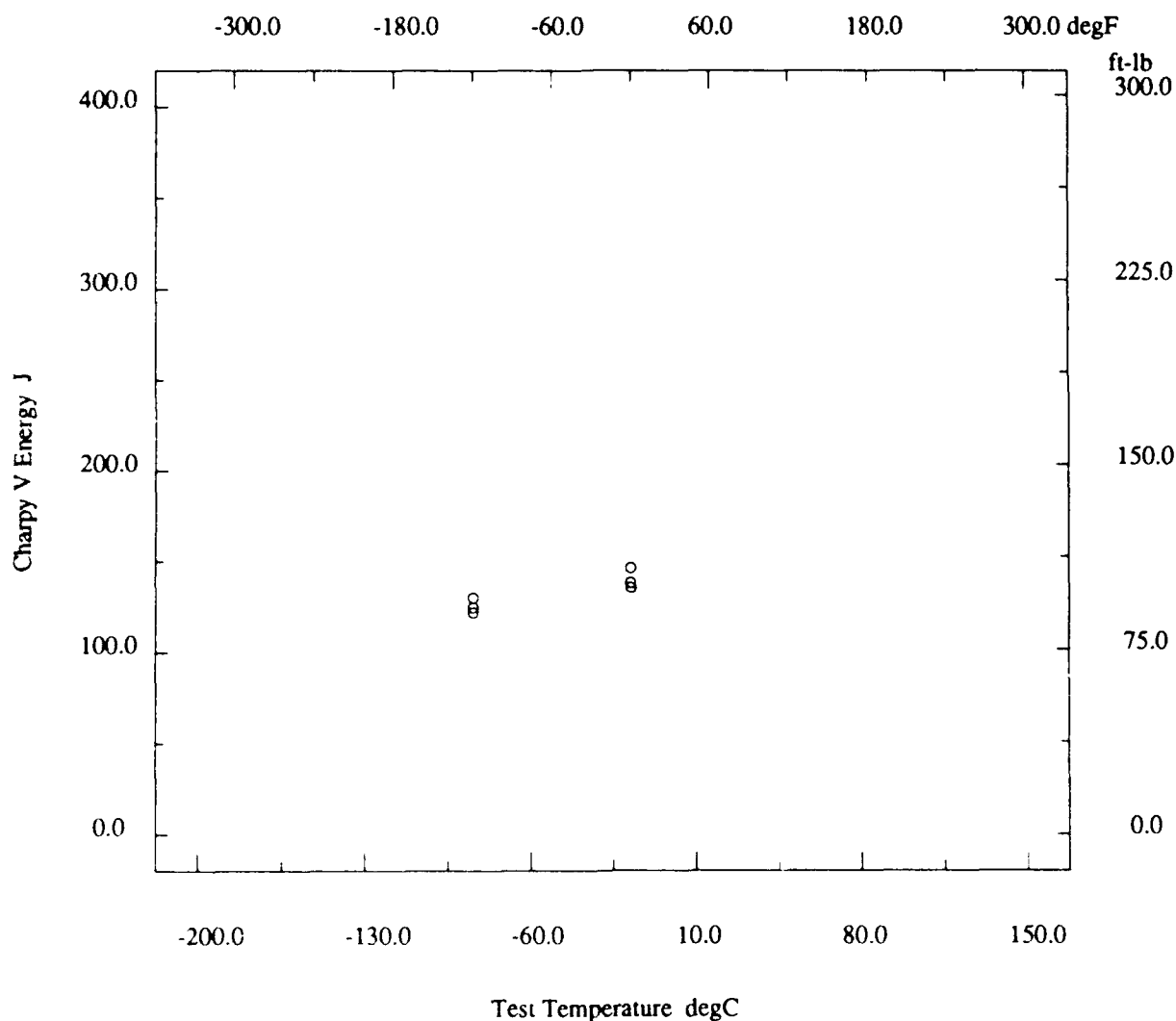
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	90
T-L °	-120	92
T-L °	-120	96
T-L °	0	100
T-L °	0	102
T-L °	0	108

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.9

Description			
Material Code	001.019.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.10

<b>Description</b>			
Material Code	001.019.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	590	*

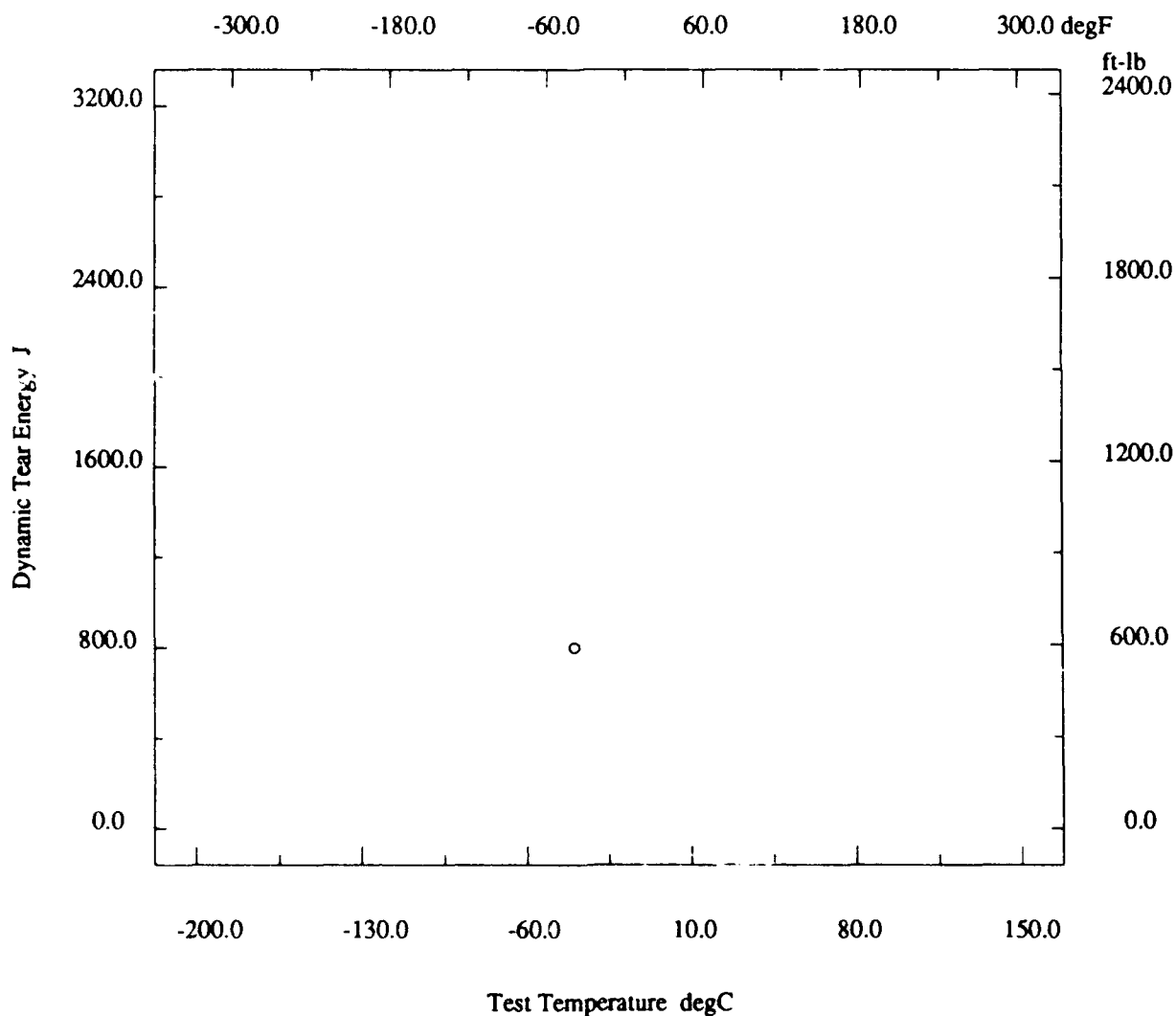
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.11

Description			
Material Code	001.019.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18300.12

<b>Description</b>						
Material Code	001.019.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	4 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D4030-4A			
Reference	USN-1					
<b>Composition</b>		See Page 18300.1				
<b>Fabrication History</b>		See Page 18300.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	118.0	105.6	*	21	68.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.13

<b>Description</b>			
Material Code	001.019.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	88
T-L °	-120	88
T-L °	-120	90
T-L °	0	116
T-L °	0	116
T-L °	0	118

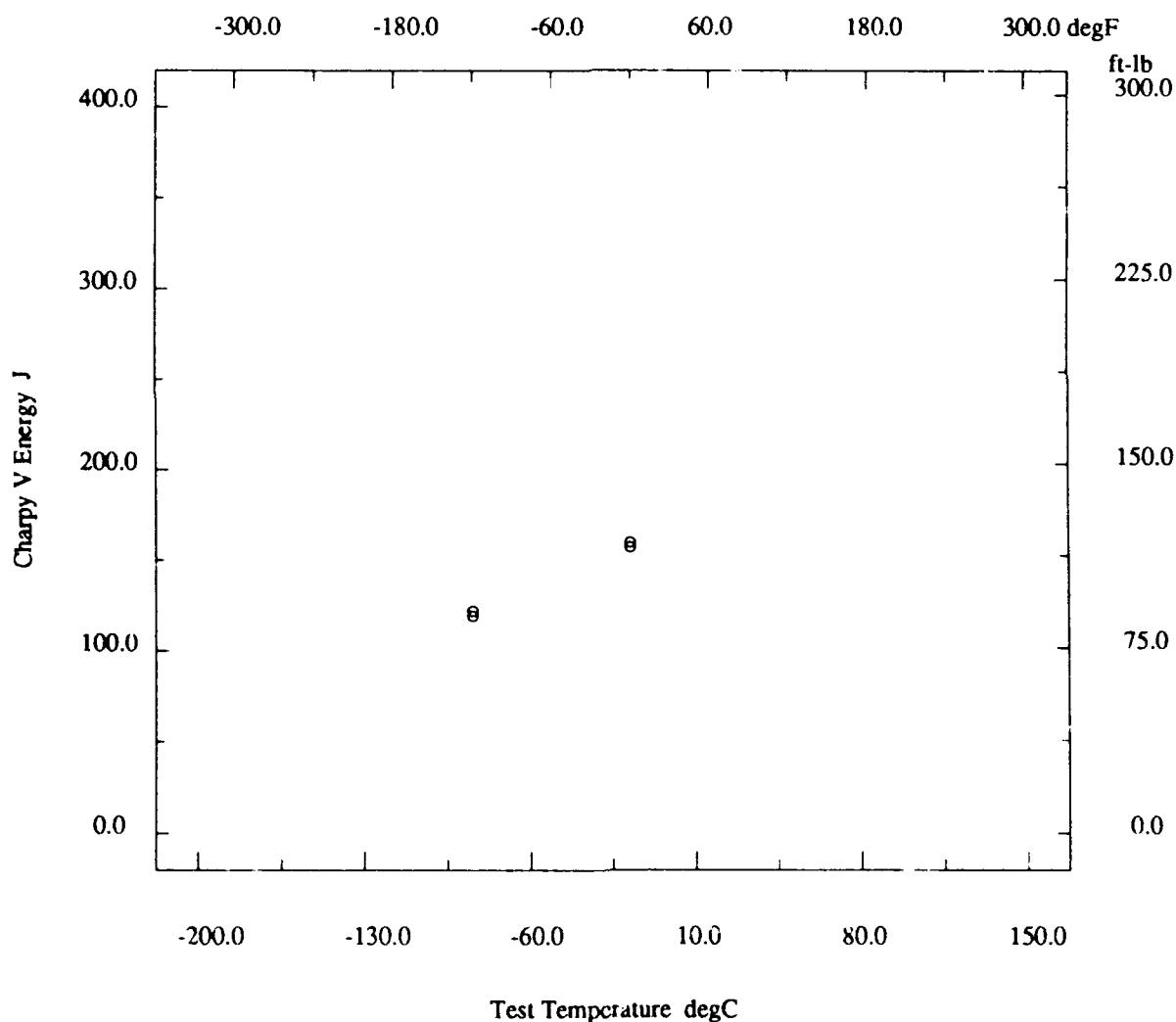
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.14

Description			
Material Code	001.019.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.15

<b>Description</b>		
Material Code	001.019.01T2	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	4 in	Composition Type Actual
Composition Position	Ladle	Lot ID D4030-4A
Reference	USN-1	

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.1
----------------------------	------------------

<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position 1/4T
Specimen Type	Dynamic Tear	Notch Preparation Pressed
Specimen Thickness	0.625 in	Loading Rate *
Standard Method	*	Standard Year *

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	625	*

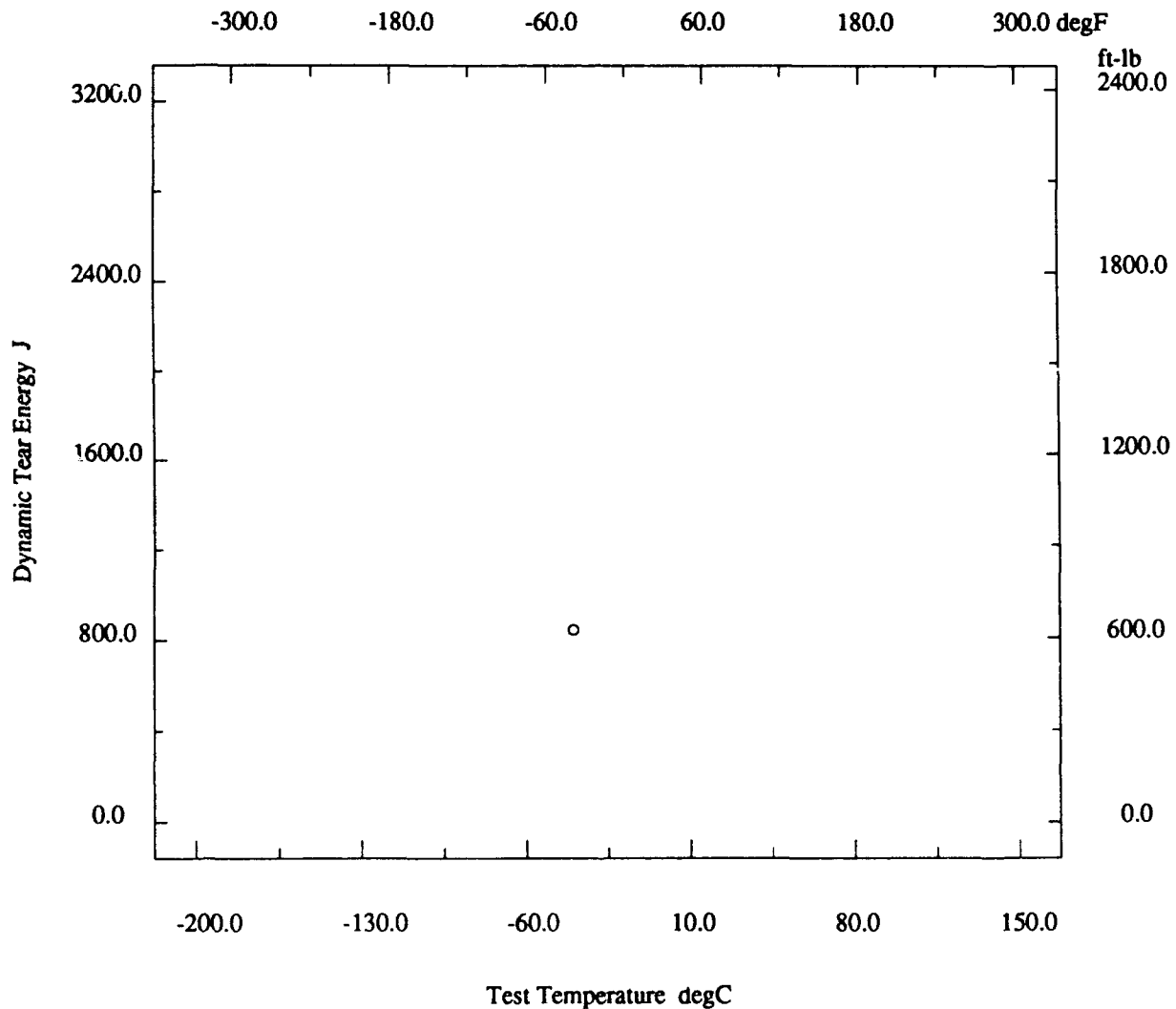
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.16

Description			
Material Code	001.019.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.17

<b>Description</b>	
Material Code ..... 001.019.01M1	Material Name ..... HY80
UNS ..... *	Other Designation ..... *
Type ..... Wrought Metal	Form ..... Plate
Thickness ..... 4 in	Composition Type ..... Actual
Composition Position ..... Ladle	Lot ID ..... D4030-4A
Reference ..... USN-1	
<b>Composition</b> See Page 18300.1	
<b>Fabrication History</b>	
Heat Treatment ..... A,Q,T	Producer ..... *
Year Produced ..... 1982	Addl Info ..... No
Source ..... *	Melting Practice ..... *
Ingot Position ..... Mid	Killing Process ..... *
Process Temperature ..... 1650 degF	Process Time ..... 6 hr
Rolling Conditions ..... 66 %	Final Processing ..... A,Q,T
Final Temperature ..... 1160 degF	Final Time ..... 5 hr
Cold Work Strain ..... *	Aging Temperature ..... *
Aging Time ..... *	Location ..... *
<b>Property Measurements</b>	
Test Type ..... Tensile	Position ..... 1/4T
Specimen Type ..... *	Specimen Thickness ..... *
Gage Length ..... *	Loading Rate ..... *
Tensile Strength Offset ..... *	Uniform Elongation ..... *
Tensile Modulus ..... *	Standard Method ..... *
Standard Year ..... *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	116.0	102.9	*	21	69.0

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.18

<b>Description</b>	
Material Code .....	001.019.01M1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	4 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D4030-4A
Reference .....	USN-1
<b>Composition</b>	
See Page 18300.1	
<b>Fabrication History</b>	
See Page 18300.17	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

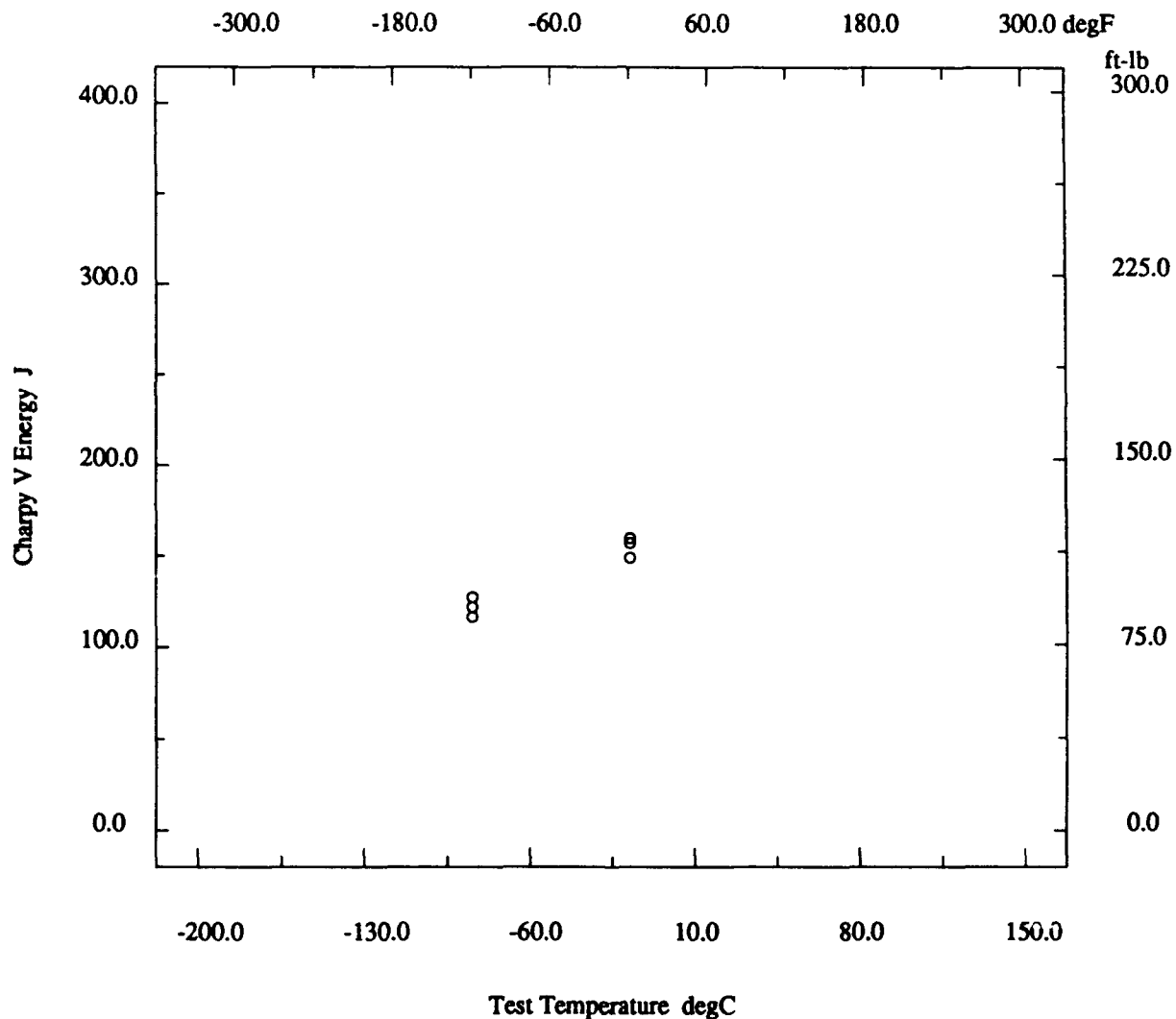
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	86
T-L °	-120	90
T-L °	-120	94
T-L °	0	110
T-L °	0	116
T-L °	0	118

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.19

Description			
Material Code	001.019.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18300.20

<b>Description</b>	
Material Code .....	001.019.01M1
UNS .....	*
Type .....	Wrought Metal
Thickness .....	4 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	D4030-4A

**Composition** See Page 18300.1

**Fabrication History** See Page 18300.17

## Property Measurements

Test Type .....	Dynamic Tear	Position .....	1/4T
Specimen Type .....	Dynamic Tear	Notch Preparation .....	Pressed
Specimen Thickness .....	0.625 in	Loading Rate .....	*
Standard Method .....	*	Standard Year .....	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	600	*

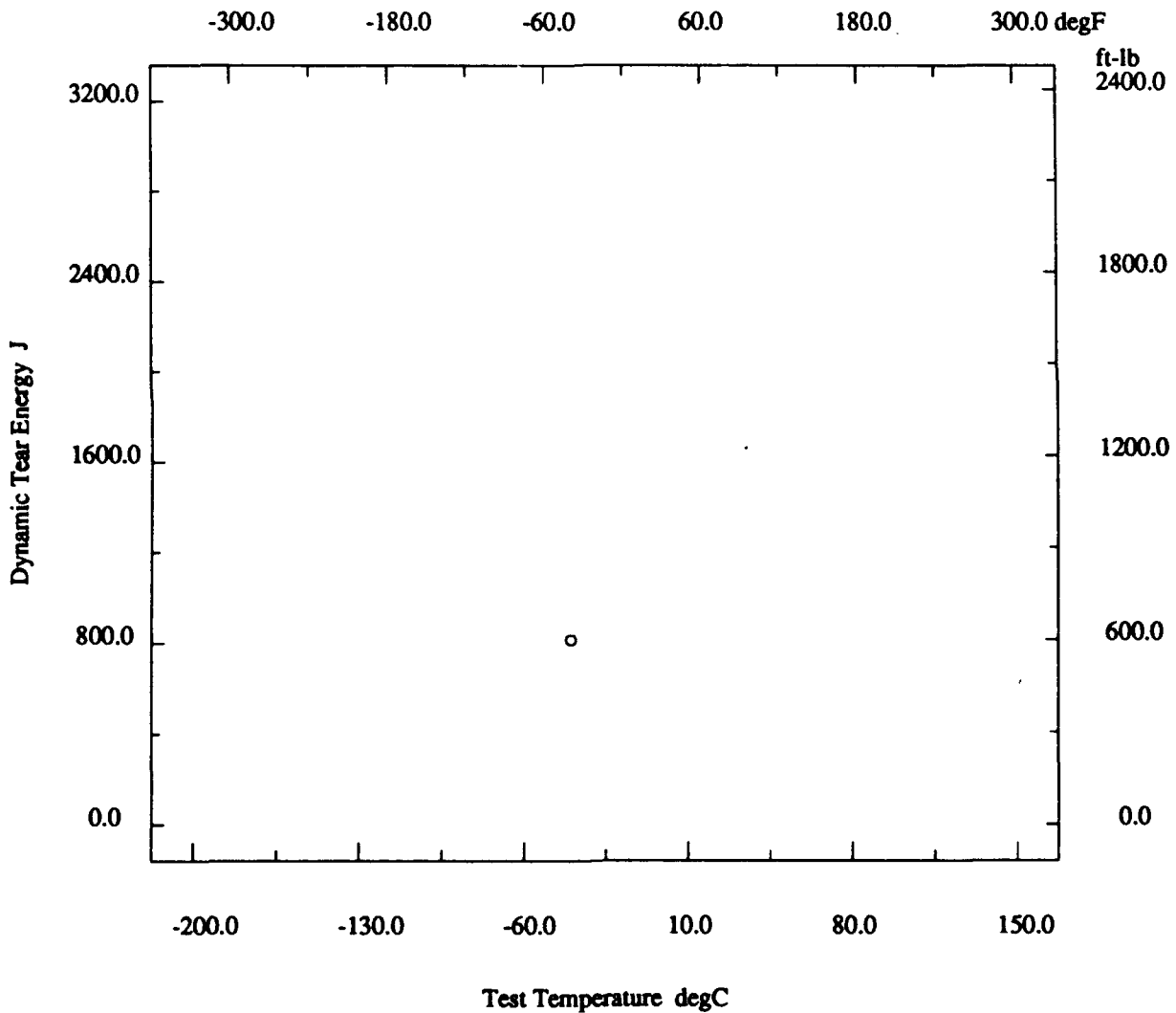
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.21

Description			
Material Code	001.019.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.22

<b>Description</b>						
Material Code	001.019.01MM			Material Name	HY80	
UNS	*			Other Designation	*	
Type	Wrought Metal			Form	Plate	
Thickness	4 in			Composition Type	Actual	
Composition Position	Ladle			Lot ID	D4030-4A	
Reference	USN-1					
<b>Composition</b>				See Page 18300.1		
<b>Fabrication History</b>				See Page 18300.17		
<b>Property Measurements</b>						
Test Type	Tensile			Position	1/4T	
Specimen Type	*			Specimen Thickness	*	
Gage Length	*			Loading Rate	*	
Tensile Strength Offset	*			Uniform Elongation	*	
Tensile Modulus	*			Standard Method	*	
Standard Year	*					
<b>Orient</b>	<b>Test Temp</b> degF	<b>UTS</b> ksi	<b>TYS</b> ksi	<b>TYP</b> ksi	<b>Elongation</b> %	<b>RA</b> %
T	Room	121.0	107.8	*	20	65.0

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.23

<b>Description</b>	
Material Code .....	001.019.01MM
UNS .....	*
Type .....	Wrought Metal
Thickness .....	4 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	D4030-4A
<b>Composition</b>	
See Page 18300.1	
<b>Fabrication History</b>	
See Page 18300.17	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	1/4T
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	90
T-L °	-120	90
T-L °	-120	90
T-L °	0	120
T-L °	0	120
T-L °	0	122

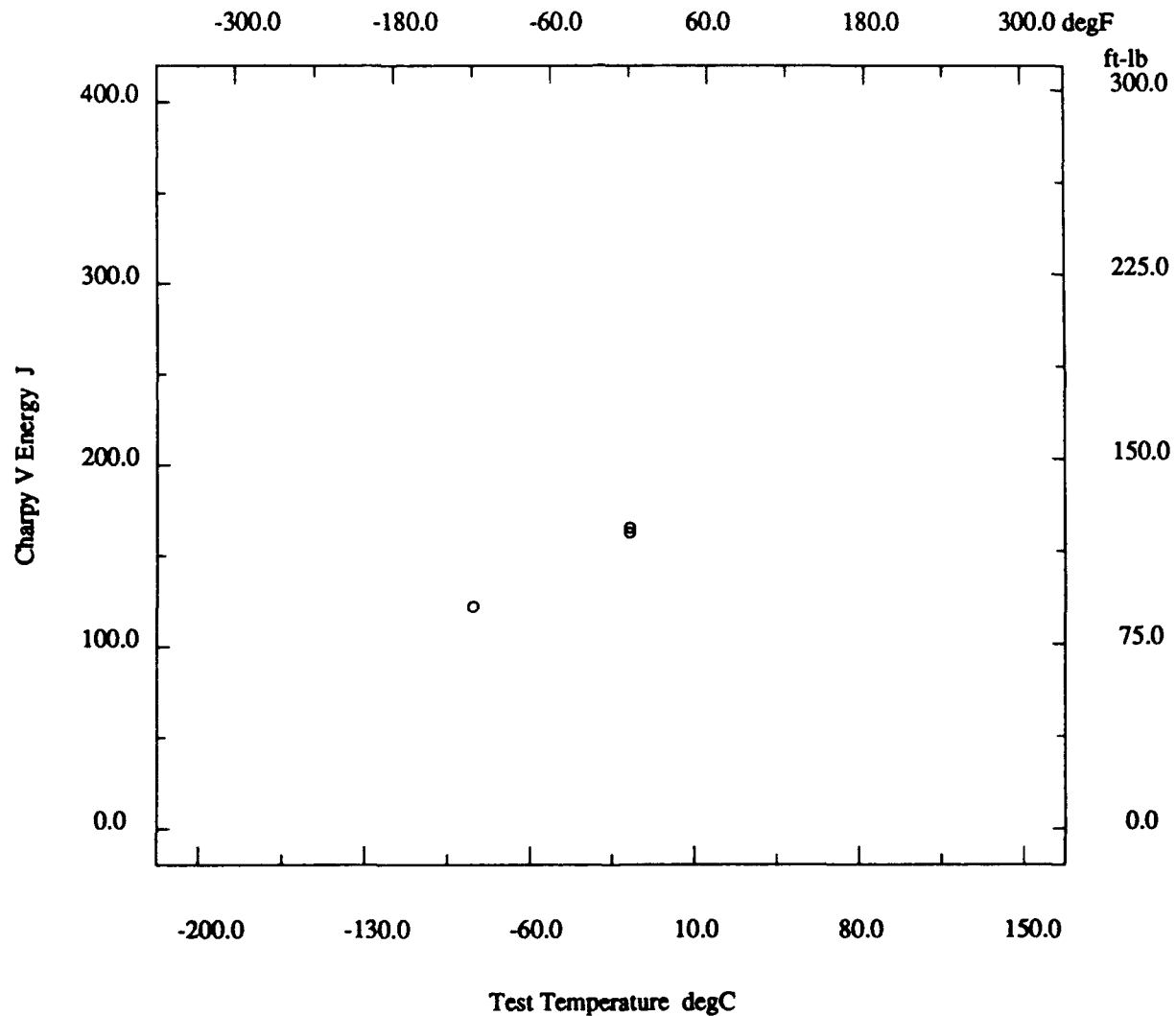
\* - not reported

# Marine Structural Toughness Data Bank

**Material HY80**

Page 18300.24

<b>Description</b>			
Material Code	001.019.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.25

<b>Description</b>	
Material Code .....	001.019.01MM
UNS .....	*
Type .....	Wrought Metal
Thickness .....	4 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	D4030-4A

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.17
----------------------------	-------------------

<b>Property Measurements</b>	
Test Type .....	Dynamic Tear
Specimen Type .....	Dynamic Tear
Specimen Thickness .....	0.625 in
Standard Method .....	*
Position .....	1/4T
Notch Preparation .....	Pressed
Loading Rate .....	*
Standard Year .....	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	905	*

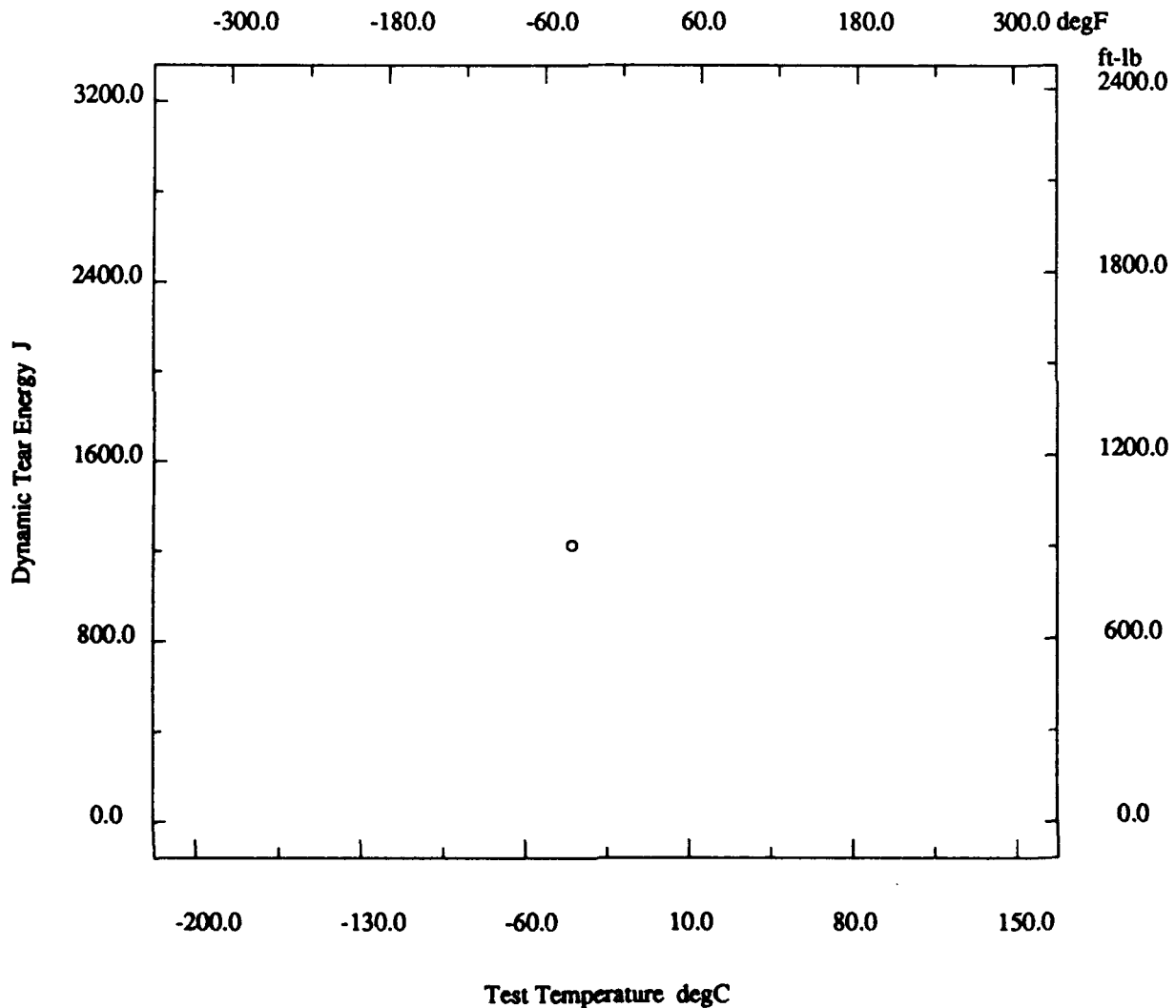
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.26

Description			
Material Code	001.019.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.27

<b>Description</b>						
Material Code	001.019.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	4 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D4030-4A			
Reference	USN-1					
<b>Composition</b>		See Page 18300.1				
<b>Fabrication History</b>		See Page 18300.17				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
<b>Orient</b>	<b>Test Temp</b>	<b>UTS</b>	<b>TYS</b>	<b>TYP</b>	<b>Elongation</b>	<b>RA</b>
	degF	ksi	ksi	ksi	%	%
T	Room	116.0	103.5	*	22	69.0

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18300.28

<b>Description</b>	
Material Code	001.019.01M2
UNS	*
Type	Wrought Metal
Thickness	4 in
Composition Position	Ladle
Reference	USN-1
Material Name	HY80
Other Designation	*
Form	Plate
Composition Type	Actual
Lot ID	D4030-4A

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.17
----------------------------	-------------------

<b>Property Measurements</b>	
Test Type	Charpy V Impact
Specimen Type	Full
Shear Fracture	*
Did Specimen Split?	*
Standard Year	*
Position	1/4T
Lateral Expansion	*
Did Specimen Fracture?	Assumed
Standard Method	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	108
T-L ◦	-120	90
T-L ◦	-120	96
T-L ◦	0	116
T-L ◦	0	116
T-L ◦	0	118

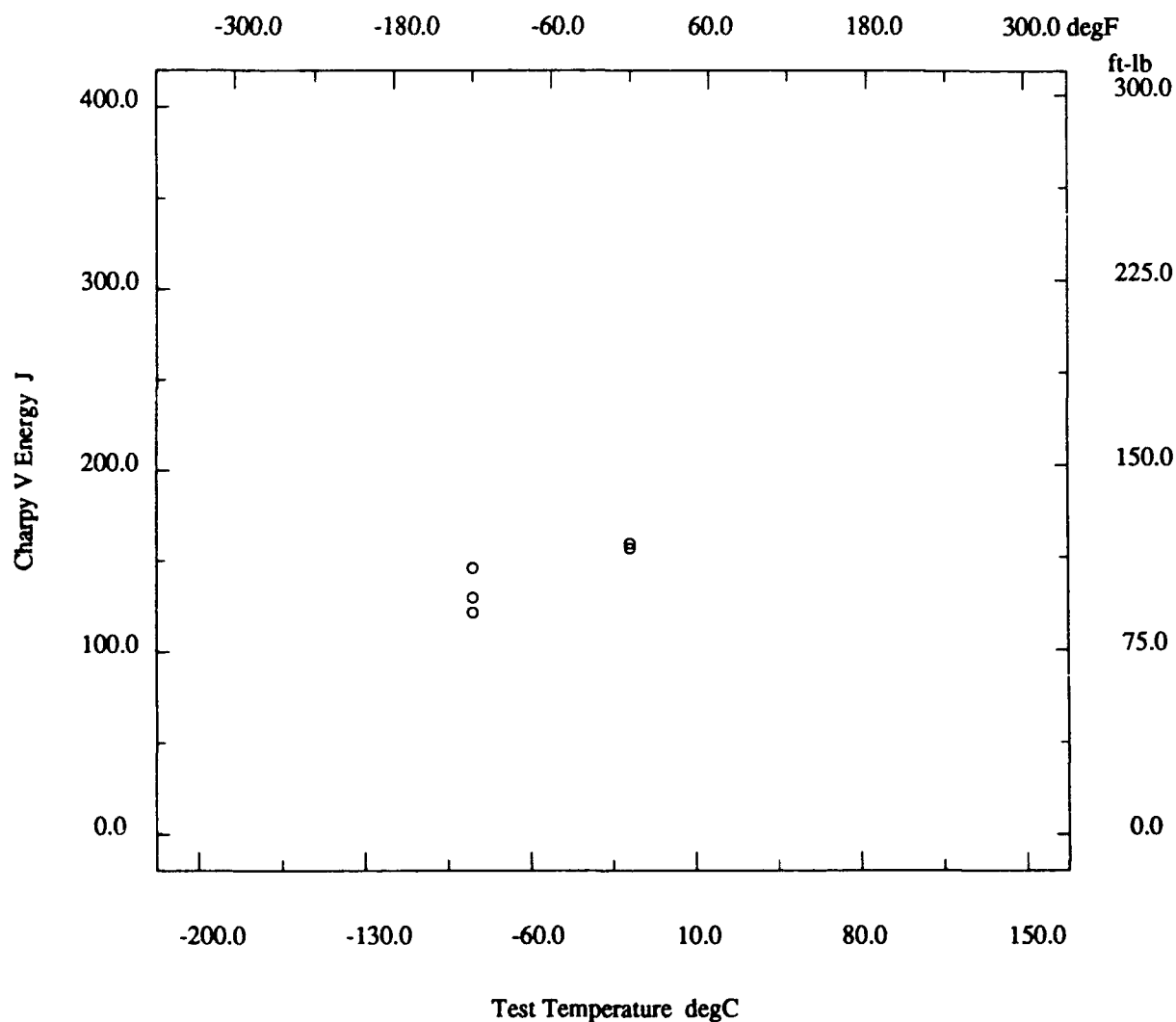
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.29

Description			
Material Code	001.019.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.30

<b>Description</b>			
Material Code	001.019.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.17
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L ◊	-40	585	*

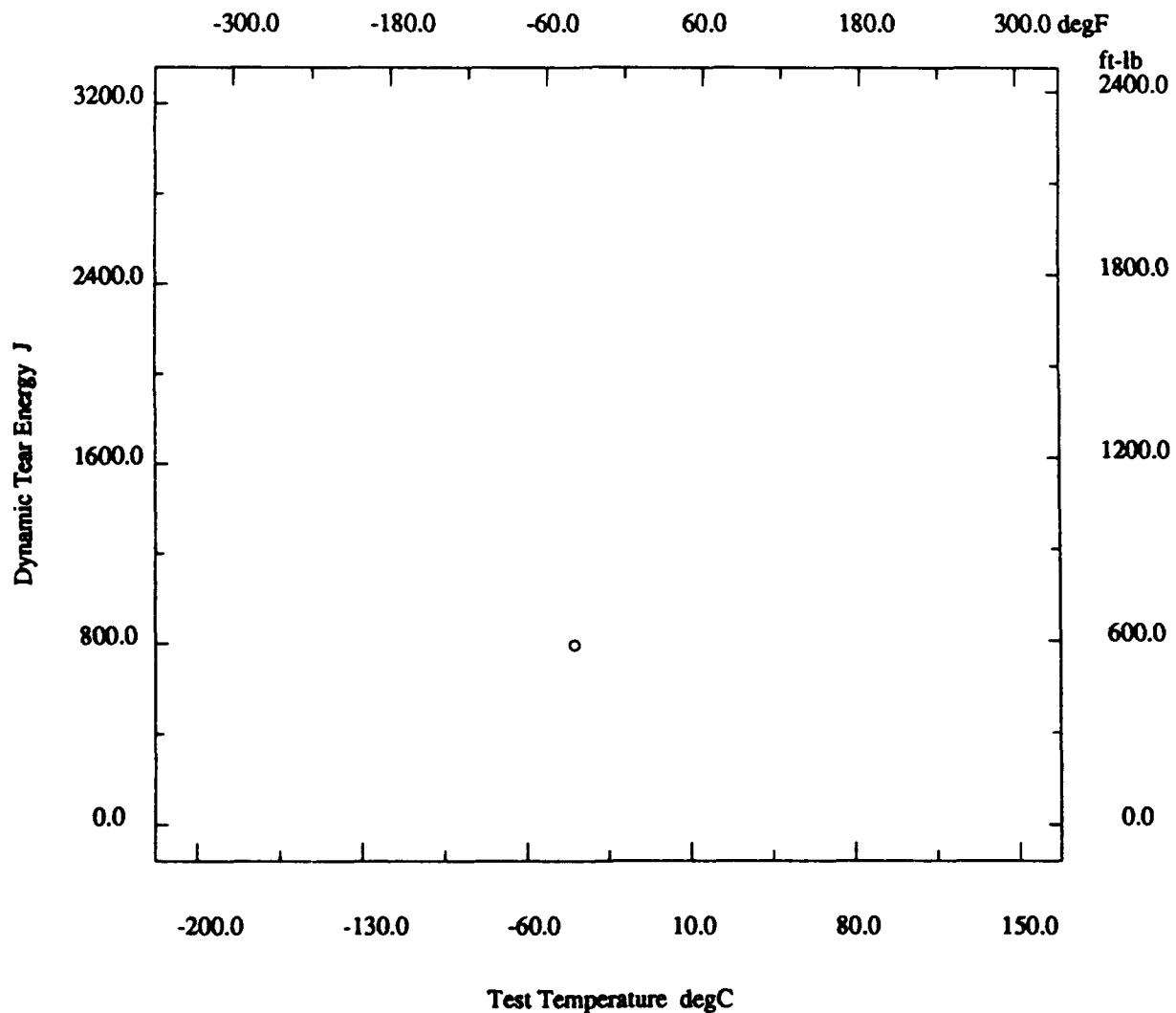
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.31

Description			
Material Code	001.019.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.32

<b>Description</b>	
Material Code . . . . . 001.019.01B1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 4 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . D4030-4A
Reference . . . . . USN-1	
<b>Composition</b> See Page 18300.1	
<b>Fabrication History</b>	
Heat Treatment . . . . . A,Q,T	Producer . . . . . *
Year Produced . . . . . 1982	Addl Info . . . . . No
Source . . . . . *	Melting Practice . . . . . *
Ingot Position . . . . . Bottom	Killing Process . . . . . *
Process Temperature . . . . . 1650 degF	Process Time . . . . . 6 hr
Rolling Conditions . . . . . 66 %	Final Processing . . . . . A,Q,T
Final Temperature . . . . . 1160 degF	Final Time . . . . . 5 hr
Cold Work Strain . . . . . *	Aging Temperature . . . . . *
Aging Time . . . . . *	Location . . . . . *
<b>Property Measurements</b>	
Test Type . . . . . Tensile	Position . . . . . 1/4T
Specimen Type . . . . . *	Specimen Thickness . . . . . *
Gage Length . . . . . *	Loading Rate . . . . . *
Tensile Strength Offset . . . . . *	Uniform Elongation . . . . . *
Tensile Modulus . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	113.0	101.1	*	22	71.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.33

<b>Description</b>		
Material Code	001.019.01B1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	4 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D4030-4A

**Composition** See Page 18300.1

**Fabrication History** See Page 18300.32

**Property Measurements**

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	76
T-L °	-120	80
T-L °	-120	88
T-L °	0	110
T-L °	0	110
T-L °	0	110

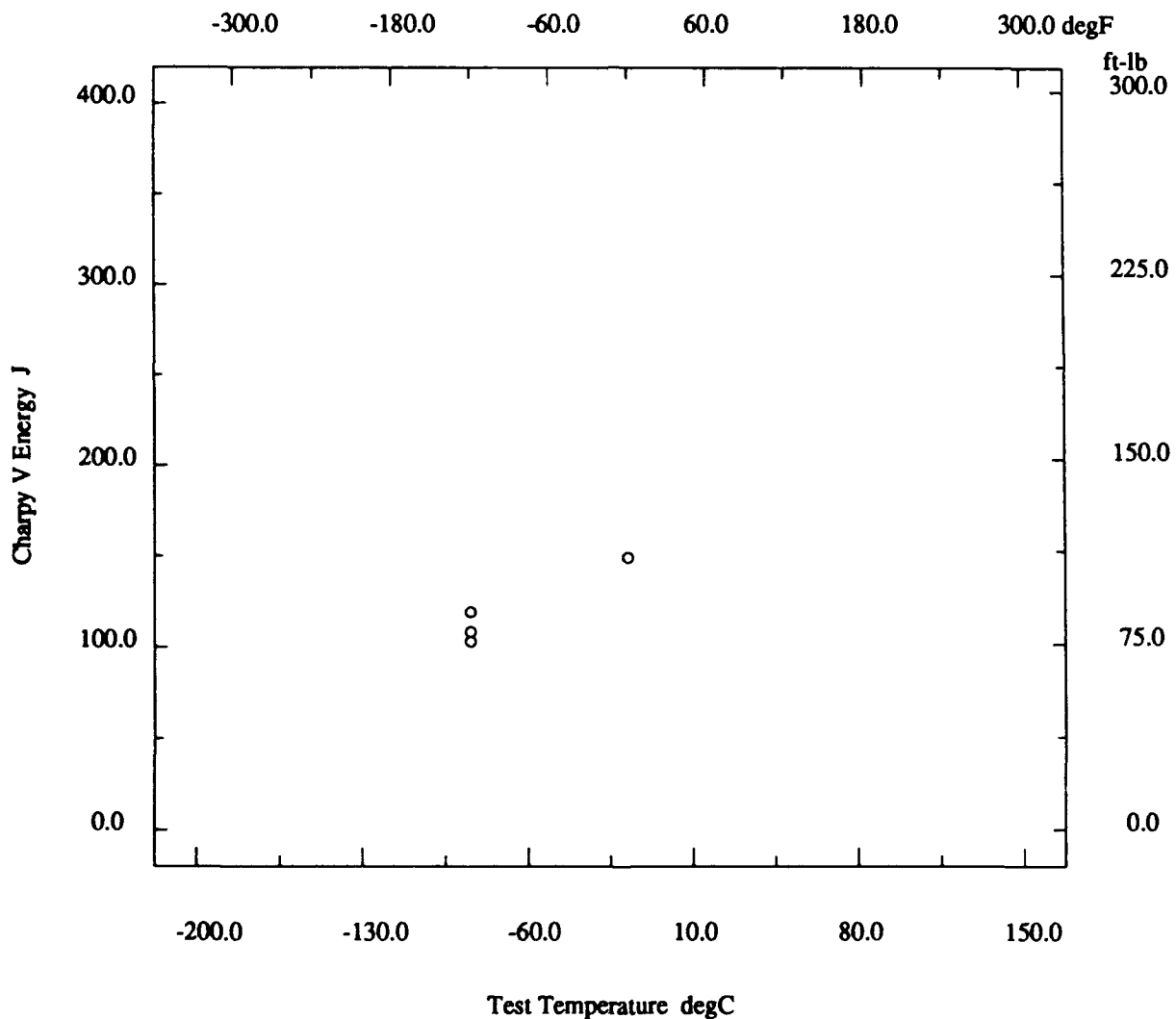
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.34

Description			
Material Code	001.019.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.35

<b>Description</b>			
Material Code	001.019.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.32
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	545	*

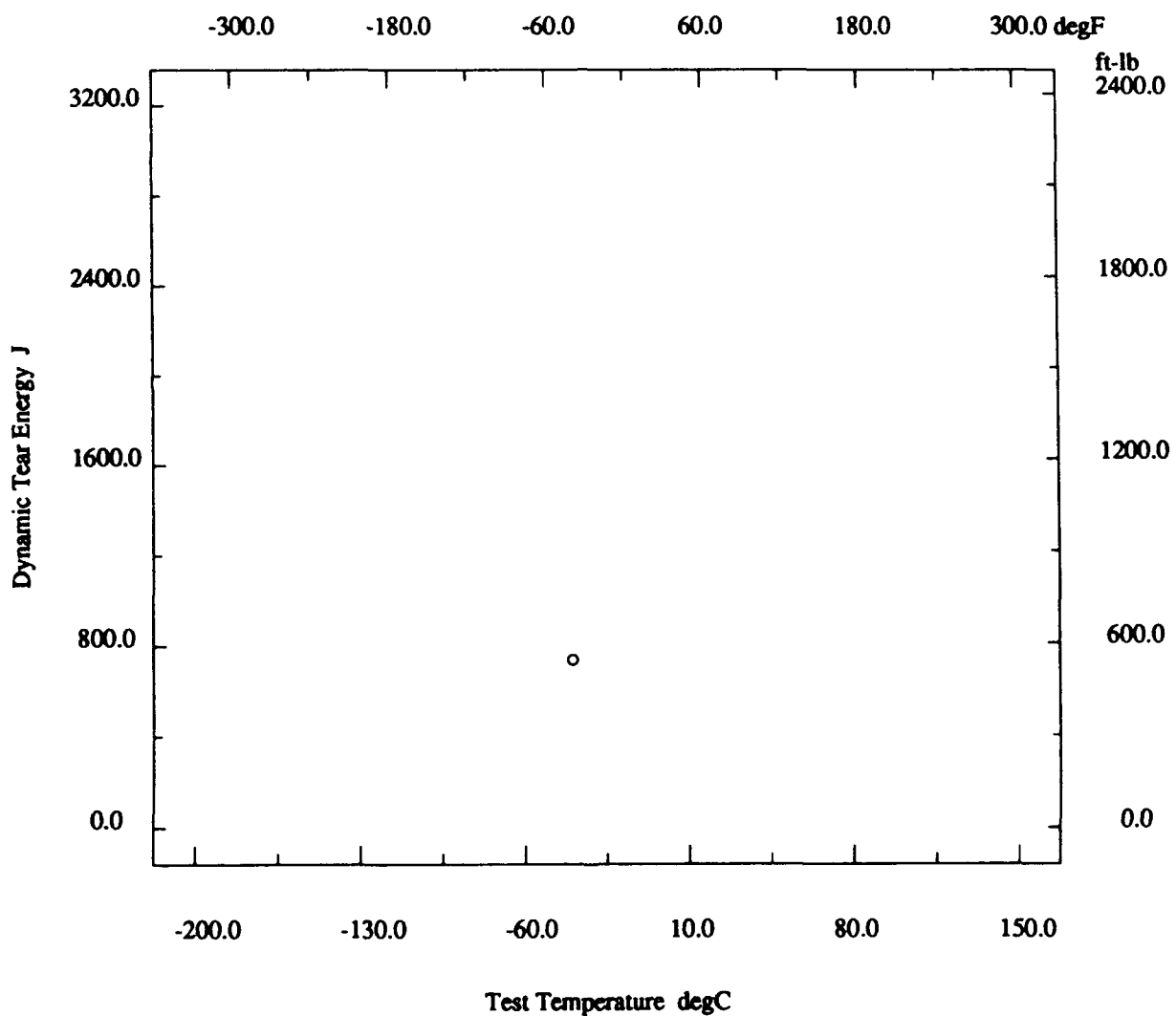


# Marine Structural Toughness Data Bank

Material HY80

Page 18300.36

Description			
Material Code	001.019.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.37

<b>Description</b>	
Material Code . . . . . 001.019.01BM	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 4 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . D4030-4A
Reference . . . . . USN-1	
<b>Composition</b> See Page 18300.1	
<b>Fabrication History</b> See Page 18300.32	
<b>Property Measurements</b>	
Test Type . . . . . Tensile	Position . . . . . 1/4T
Specimen Type . . . . . *	Specimen Thickness . . . . . *
Gage Length . . . . . *	Loading Rate . . . . . *
Tensile Strength Offset . . . . . *	Uniform Elongation . . . . . *
Tensile Modulus . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	121.2	108.6	*	19	64.1

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.38

<b>Description</b>	
Material Code .....	001.019.01BM
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	4 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	D4030-4A
Reference .....	USN-1
<b>Composition</b>	
See Page 18300.1	
<b>Fabrication History</b>	
See Page 18300.32	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	86
T-L °	-120	92
T-L °	-120	94
T-L °	0	114
T-L °	0	118
T-L °	0	120

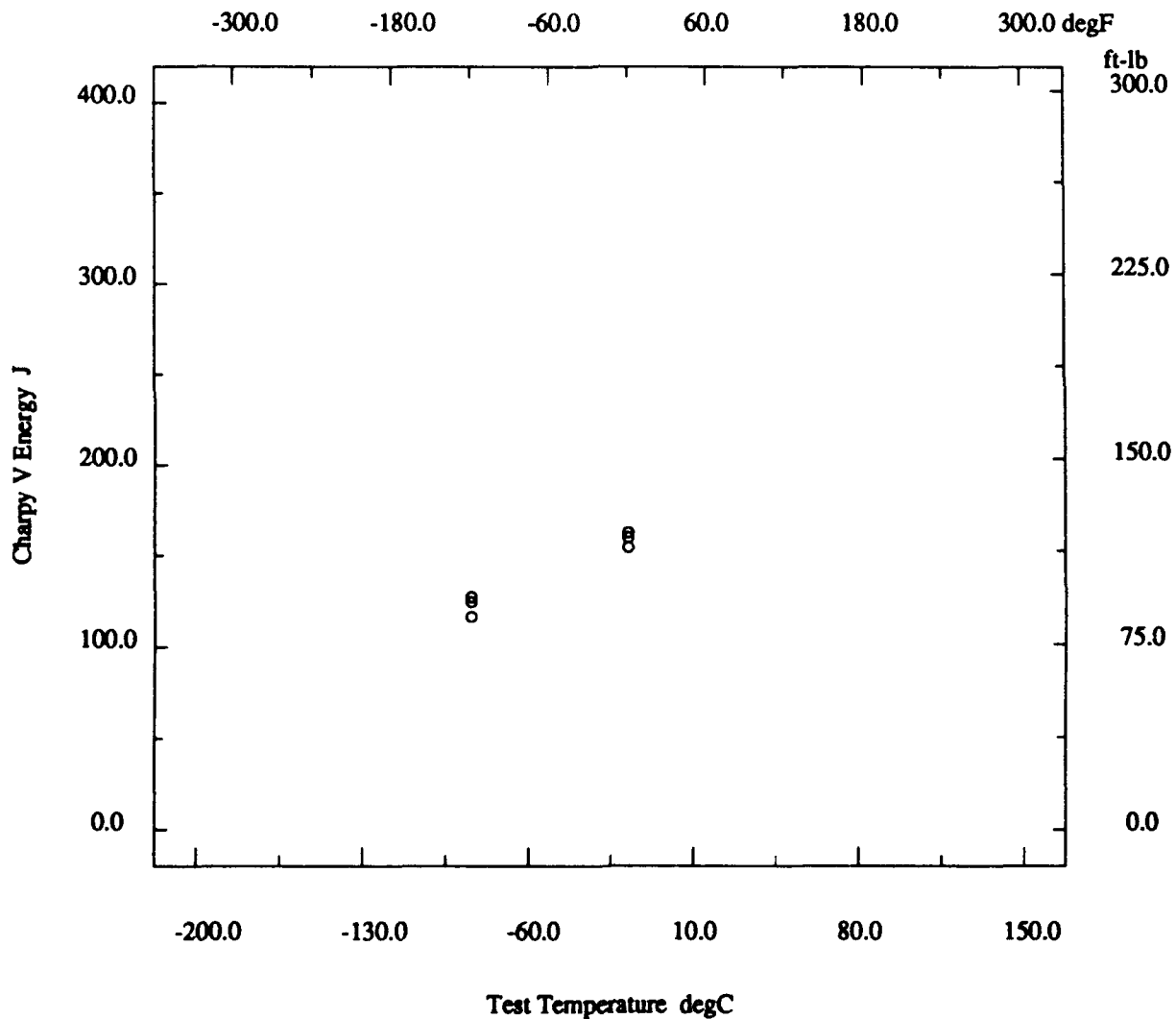
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.39

Description			
Material Code	001.019.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# • Marine Structural Toughness Data Bank

Material HY80

Page 18300.40

<b>Description</b>			
Material Code	001.019.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		
<b>Composition</b>		See Page 18300.1	
<b>Fabrication History</b>		See Page 18300.32	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	555	*

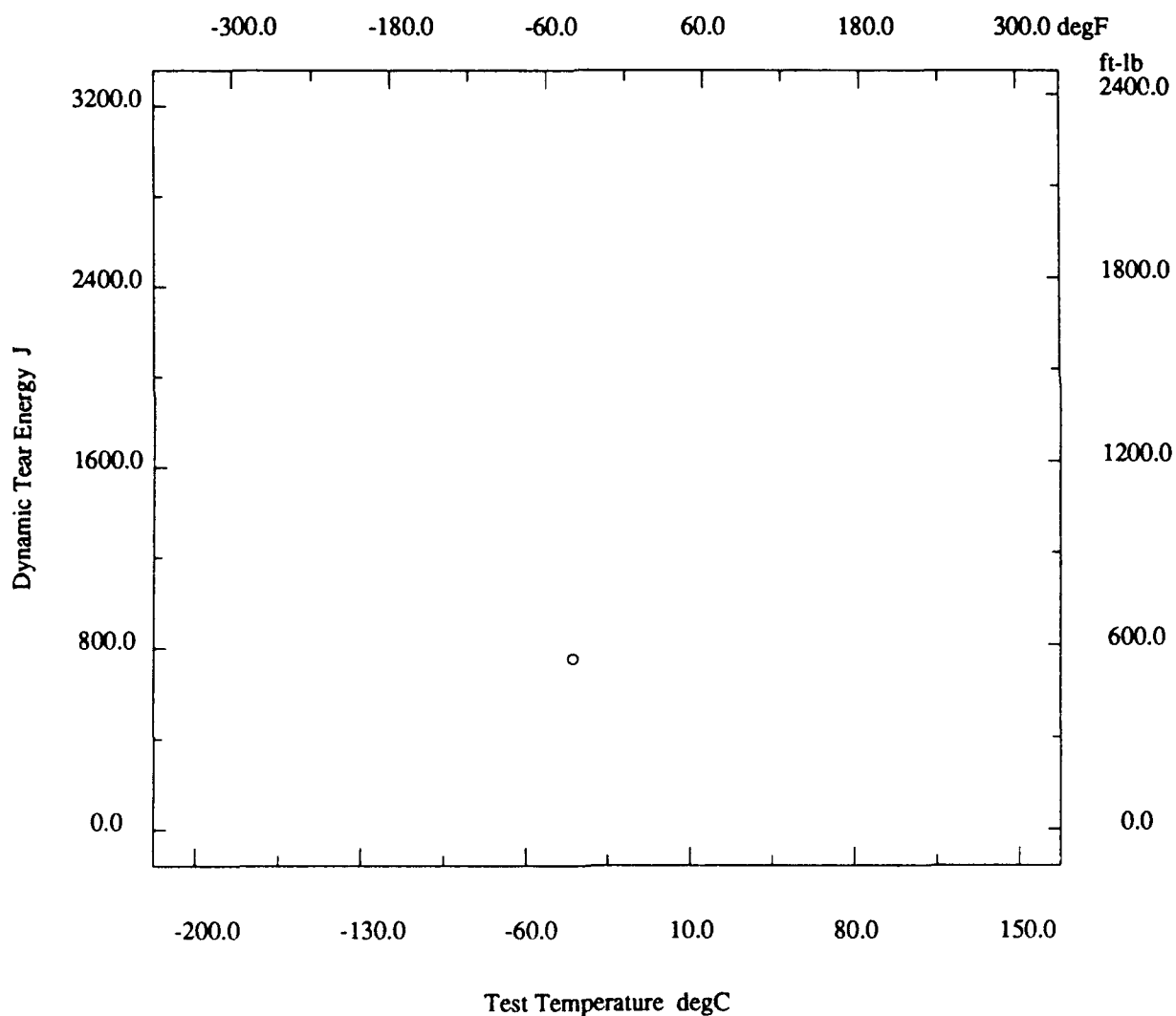
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.41

Description			
Material Code	001.019.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.42

<b>Description</b>						
Material Code	001.019.01B2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	4 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	D4030-4A			
Reference	USN-1					
<b>Composition</b>		See Page 18300.1				
<b>Fabrication History</b>		See Page 18300.32				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	116.7	106.6	*	20	71.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.43

<b>Description</b>		
Material Code	001.019.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	4 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	D4030-4A

<b>Composition</b>	See Page 18300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18300.32
----------------------------	-------------------

<b>Property Measurements</b>	
Test Type	Charpy V Impact
Specimen Type	Full
Shear Fracture	*
Did Specimen Split?	*
Standard Year	*
Position	1/4T
Lateral Expansion	*
Did Specimen Fracture?	Assumed
Standard Method	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L o	-120	90
T-L o	-120	90
T-L o	-120	92
T-L o	0	108
T-L o	0	110
T-L o	0	116

\* - not reported

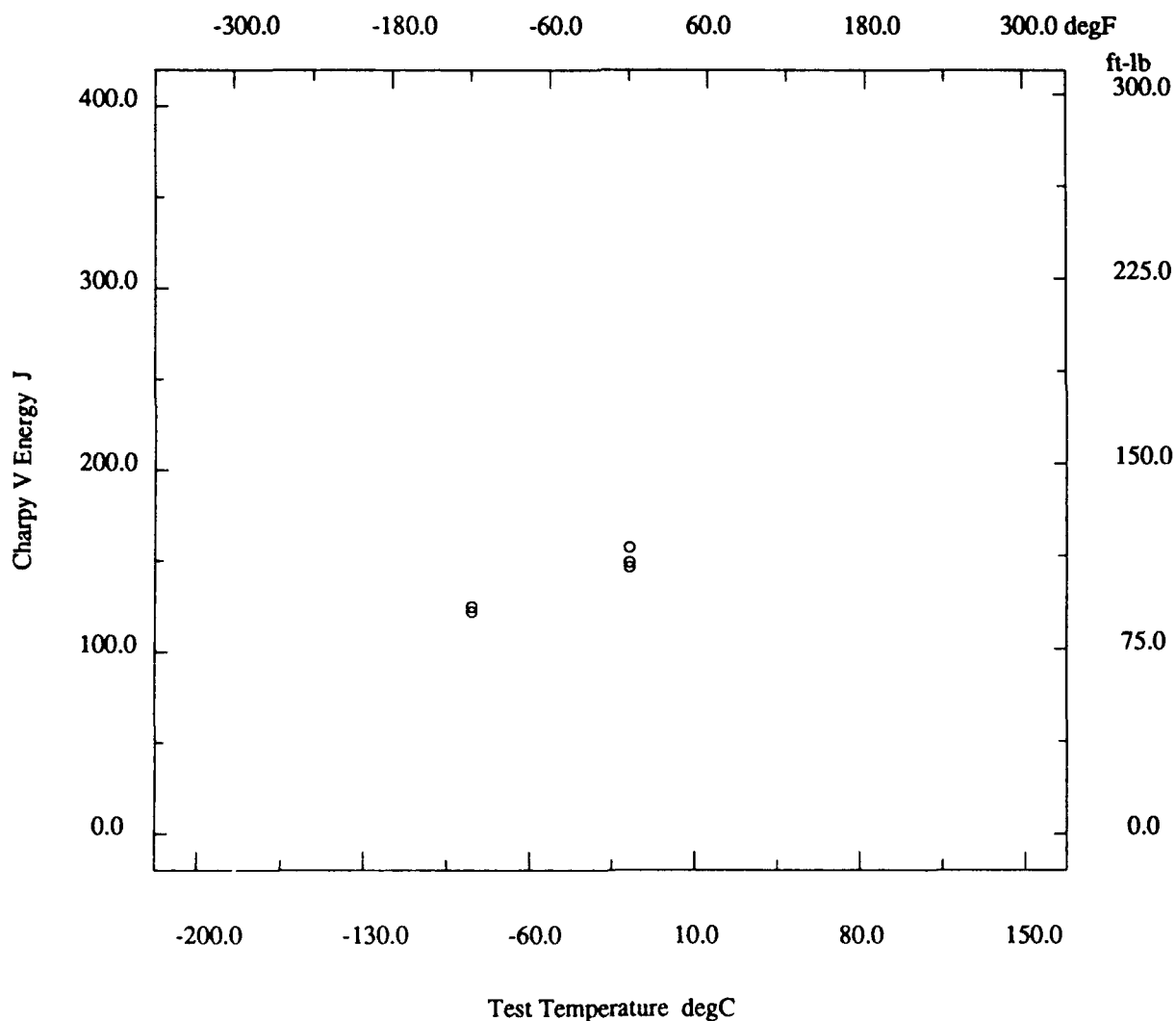


# Marine Structural Toughness Data Bank

Material HY80

Page 18300.44

Description			
Material Code	001.019.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.45

<b>Description</b>			
Material Code	001.019.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		

**Composition** See Page 18300.1

**Fabrication History** See Page 18300.32

## Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
T-L °	-40	585	*

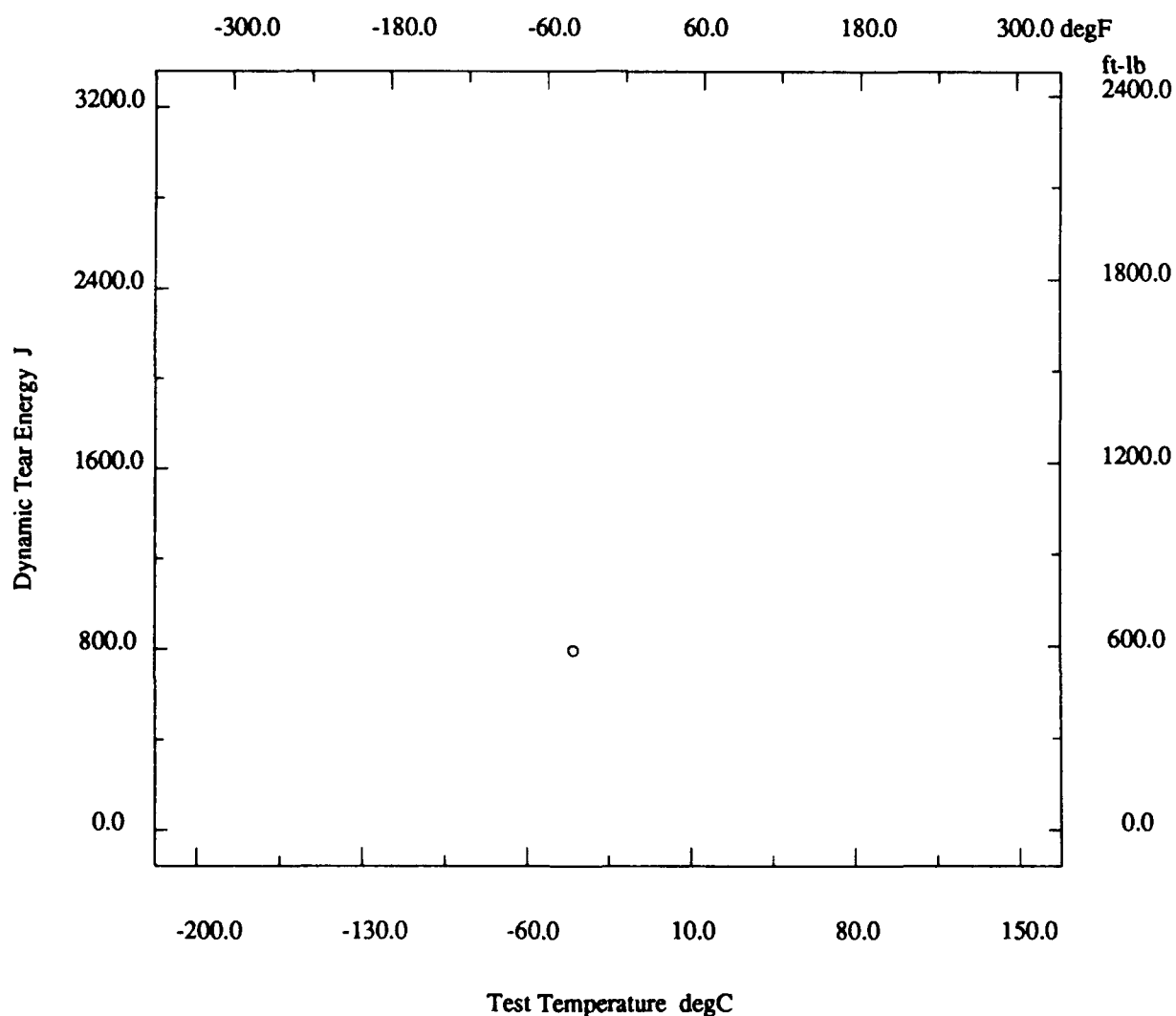
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18300.46

Description			
Material Code	001.019.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	D4030-4A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.1

<b>Description</b>			
Material Code	001.020.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		
<b>Composition</b>			
C	0.16 %	Mn	0.28 %
P	0.01 %	S	0.004 %
Si	0.23 %	Cr	1.60 %
Ni	3.17 %	Mo	0.50 %
V	0.007 %	Cu	0.13 %
Cb	*	Ti	0.003 %
B	*	Al	0.026 %
N	*	Other Components	As=0.008;Sn=0.009;Sb=0.005 %
<b>Fabrication History</b>			
Heat Treatment	A,Q,T	Producer	*
Year Produced	1982	Addl Info	No
Source	*	Melting Practice	*
Ingot Position	Top	Killing Process	*
Process Temperature	1650 degF	Process Time	5.83 hr
Rolling Conditions	91 %	Final Processing	A,Q,T
Final Temperature	1140 degF	Final Time	4.83 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	1/4T
Specimen Type	*	Specimen Thickness	*
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	124.5	111.4	*	22	71.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.2

<b>Description</b>		
Material Code	001.020.01T1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8817-1

**Composition** See Page 18400.1

**Fabrication History** See Page 18400.1

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	78
L-T °	-120	80
L-T °	-120	80
L-T °	-120	82
L-T °	-120	86
L-T °	-40	88
L-T °	-40	92
L-T °	-40	94
L-T °	-40	96
L-T °	-40	96
L-T °	0	102
L-T °	0	104
L-T °	0	94
L-T °	0	98
L-T °	0	98
L-T °	32	100
L-T °	32	102
L-T °	32	106
L-T °	32	108
L-T °	32	110
L-T °	70	110
L-T °	70	116
L-T °	70	118
L-T °	70	120
L-T °	70	122
T-L ^	-120	70
T-L ^	-120	72
T-L ^	-120	80
T-L ^	-120	86
T-L ^	-120	86
T-L ^	-40	82
T-L ^	-40	86
T-L ^	-40	88

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L ▲	-40	88
T-L ▲	-40	90
T-L ▲	0	90
T-L ▲	0	90
T-L ▲	0	92
T-L ▲	0	92
T-L ▲	0	96
T-L ▲	32	90
T-L ▲	32	96
T-L ▲	32	96
T-L ▲	32	98
T-L ▲	32	98
T-L ▲	70	102
T-L ▲	70	108
T-L ▲	70	110
T-L ▲	70	112
T-L ▲	70	98

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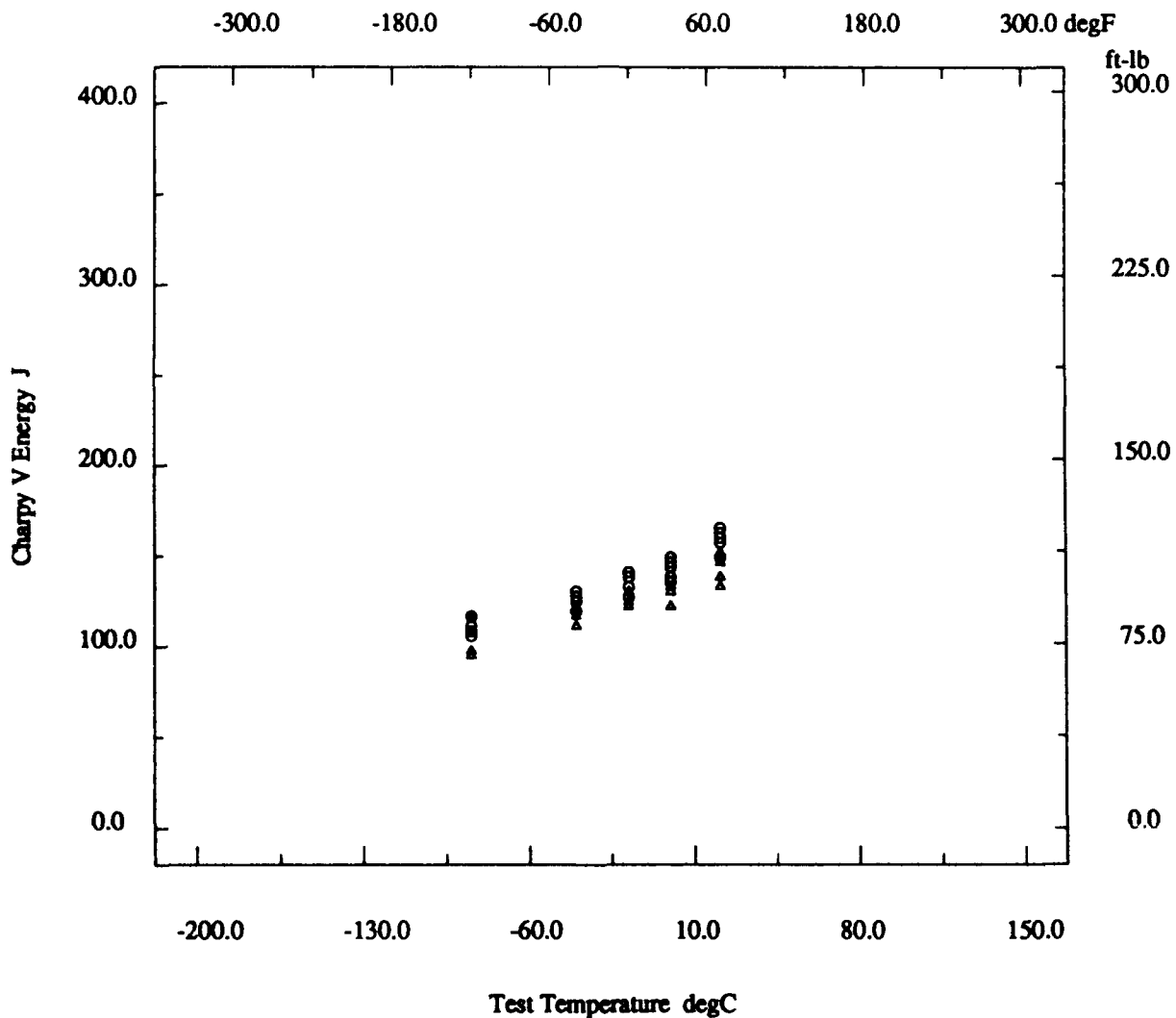
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.4

<b>Description</b>			
Material Code	001.020.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.5

<b>Description</b>						
Material Code	001.020.01TM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8817-1			
Reference	USN-1					
<b>Composition</b>		See Page 18400.1				
<b>Fabrication History</b>		See Page 18400.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
<b>Orient</b>	<b>Test Temp</b>	<b>UTS</b>	<b>TYS</b>	<b>TYP</b>	<b>Elongation</b>	<b>RA</b>
	degF	ksi	ksi	ksi	%	%
T	Room	125.9	111.9	*	22	69.2

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18400.6

<b>Description</b>		
Material Code	001.020.01TM	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	3.75 in	Composition Type Actual
Composition Position	Ladle	Lot ID B8817-1
Reference	USN-1	
<b>Composition</b>		See Page 18400.1
<b>Fabrication History</b>		See Page 18400.1
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position 1/4T
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method *
Standard Year	*	

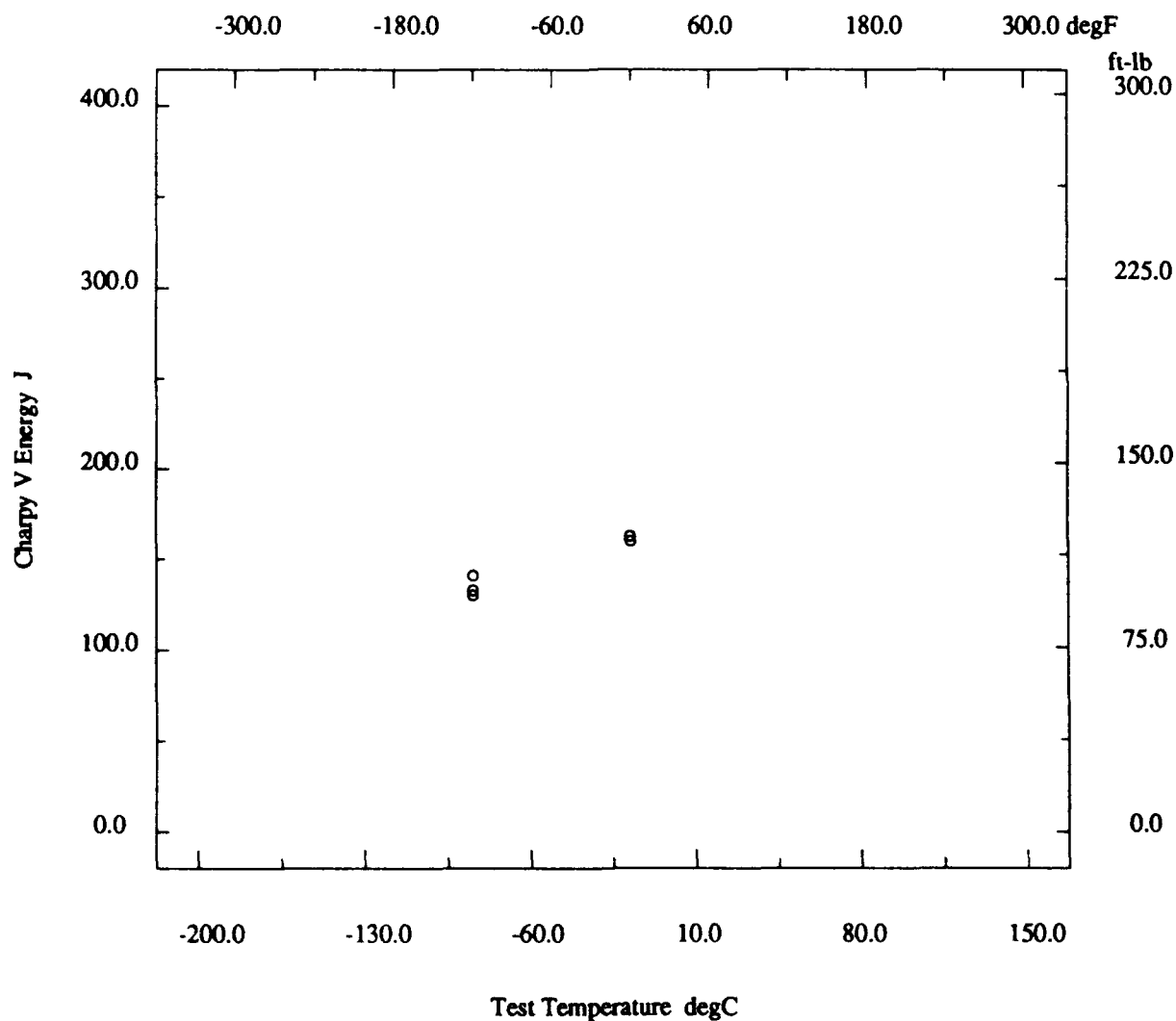
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	104
T-L °	-120	96
T-L °	-120	98
T-L °	0	118
T-L °	0	120
T-L °	0	120

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.7

Description			
Material Code	001.020.01TM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.8

<b>Description</b>						
Material Code	001.020.01T2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8817-1			
Reference	USN-1					
<b>Composition</b>		See Page 18400.1				
<b>Fabrication History</b>		See Page 18400.1				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	120.1	105.4	*	22	71.4

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.9

<b>Description</b>			
Material Code	001.020.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		
<b>Composition</b>		See Page 18400.1	
<b>Fabrication History</b>		See Page 18400.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	102
T-L °	-120	108
T-L °	-120	110
T-L °	0	122
T-L °	0	126
T-L °	0	128

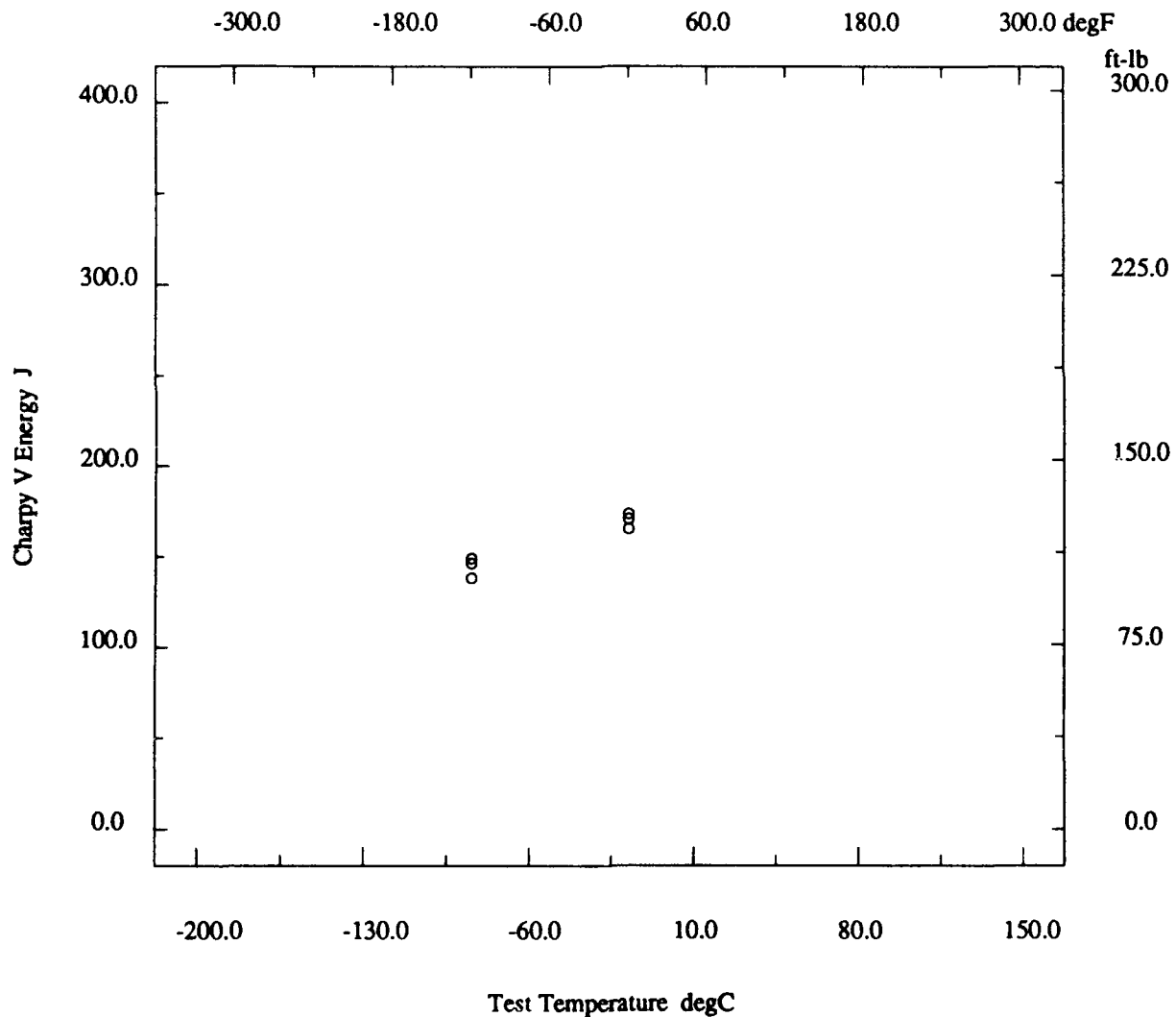
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.10

<b>Description</b>			
Material Code	001.020.01T2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.11

<b>Description</b>	
Material Code . . . . . 001.020.01M1	Material Name . . . . . HY80
UNS . . . . . *	Other Designation . . . . . *
Type . . . . . Wrought Metal	Form . . . . . Plate
Thickness . . . . . 3.75 in	Composition Type . . . . . Actual
Composition Position . . . . . Ladle	Lot ID . . . . . B8817-1
Reference . . . . . USN-1	
<b>Composition</b> . . . . . See Page 18400.1	
<b>Fabrication History</b>	
Heat Treatment . . . . . A,Q,T	Producer . . . . . *
Year Produced . . . . . 1982	Addl Info . . . . . No
Source . . . . . *	Melting Practice . . . . . *
Ingot Position . . . . . Mid	Killing Process . . . . . *
Process Temperature . . . . . 1650 degF	Process Time . . . . . 5.83 hr
Rolling Conditions . . . . . 91 %	Final Processing . . . . . A,Q,T
Final Temperature . . . . . 1140 degF	Final Time . . . . . 4.83 hr
Cold Work Strain . . . . . *	Aging Temperature . . . . . *
Aging Time . . . . . *	Location . . . . . *
<b>Property Measurements</b>	
Test Type . . . . . Tensile	Position . . . . . 1/4T
Specimen Type . . . . . *	Specimen Thickness . . . . . *
Gage Length . . . . . *	Loading Rate . . . . . *
Tensile Strength Offset . . . . . *	Uniform Elongation . . . . . *
Tensile Modulus . . . . . *	Standard Method . . . . . *
Standard Year . . . . . *	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	125.5	112.7	*	22	71.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.12

<b>Description</b>		
Material Code	001.020.01M1	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8817-1

<b>Composition</b>	See Page 18400.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18400.11
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	106
T-L °	-120	110
T-L °	-120	98
T-L °	0	116
T-L °	0	118
T-L °	0	122

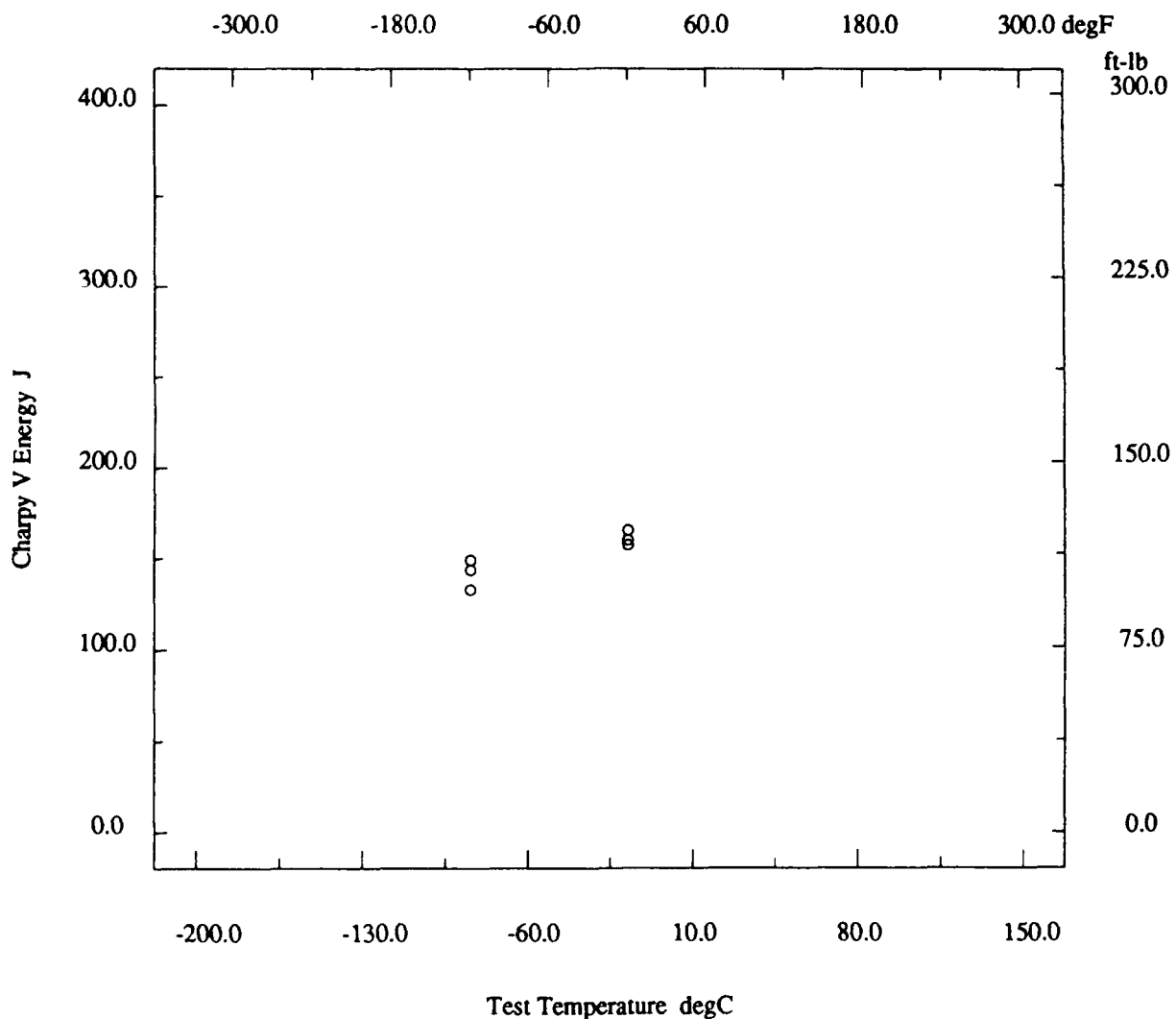
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.13

Description			
Material Code	001.020.01M1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18400.14

<b>Description</b>						
Material Code	001.020.01MM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8817-1			
Reference	USN-1					
<b>Composition</b>		See Page 18400.1				
<b>Fabrication History</b>		See Page 18400.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	118.2	103.9	*	22	69.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.15

<b>Description</b>		
Material Code	001.020.01MM	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8817-1

<b>Composition</b>	See Page 18400.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18400.11
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	110
T-L °	-120	110
T-L °	-120	118
T-L °	0	120
T-L °	0	122
T-L °	0	126

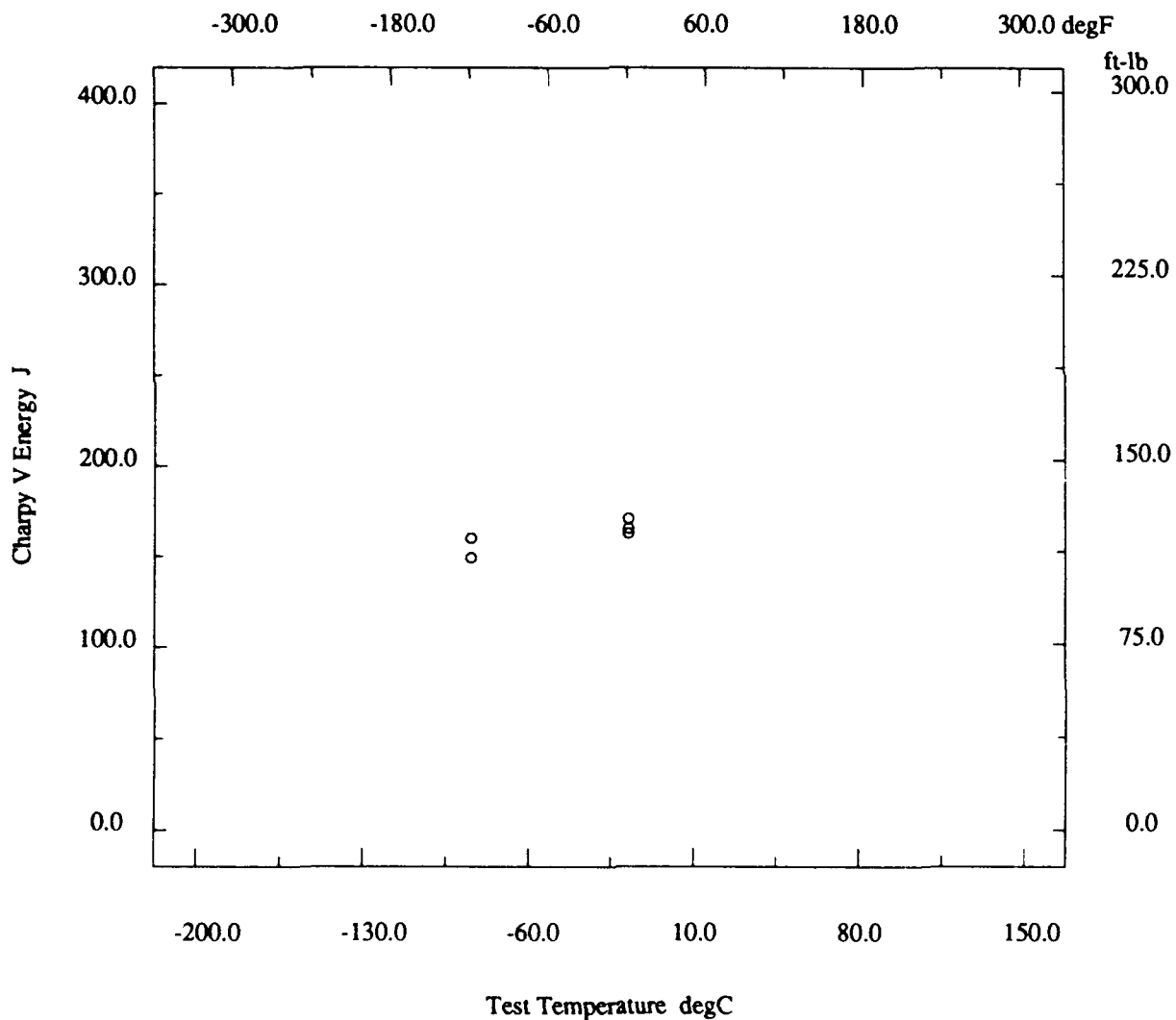
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.16

Description			
Material Code	001.020.01MM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.17

<b>Description</b>						
Material Code	001.020.01M2	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8817-1			
Reference	USN-1					
<b>Composition</b>		See Page 18400.1				
<b>Fabrication History</b>		See Page 18400.11				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	120.2	105.1	*	21	71.2

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.18

<b>Description</b>		
Material Code	001.020.01M2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8817-1
<b>Composition</b>		See Page 18400.1
<b>Fabrication History</b>		See Page 18400.11
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	

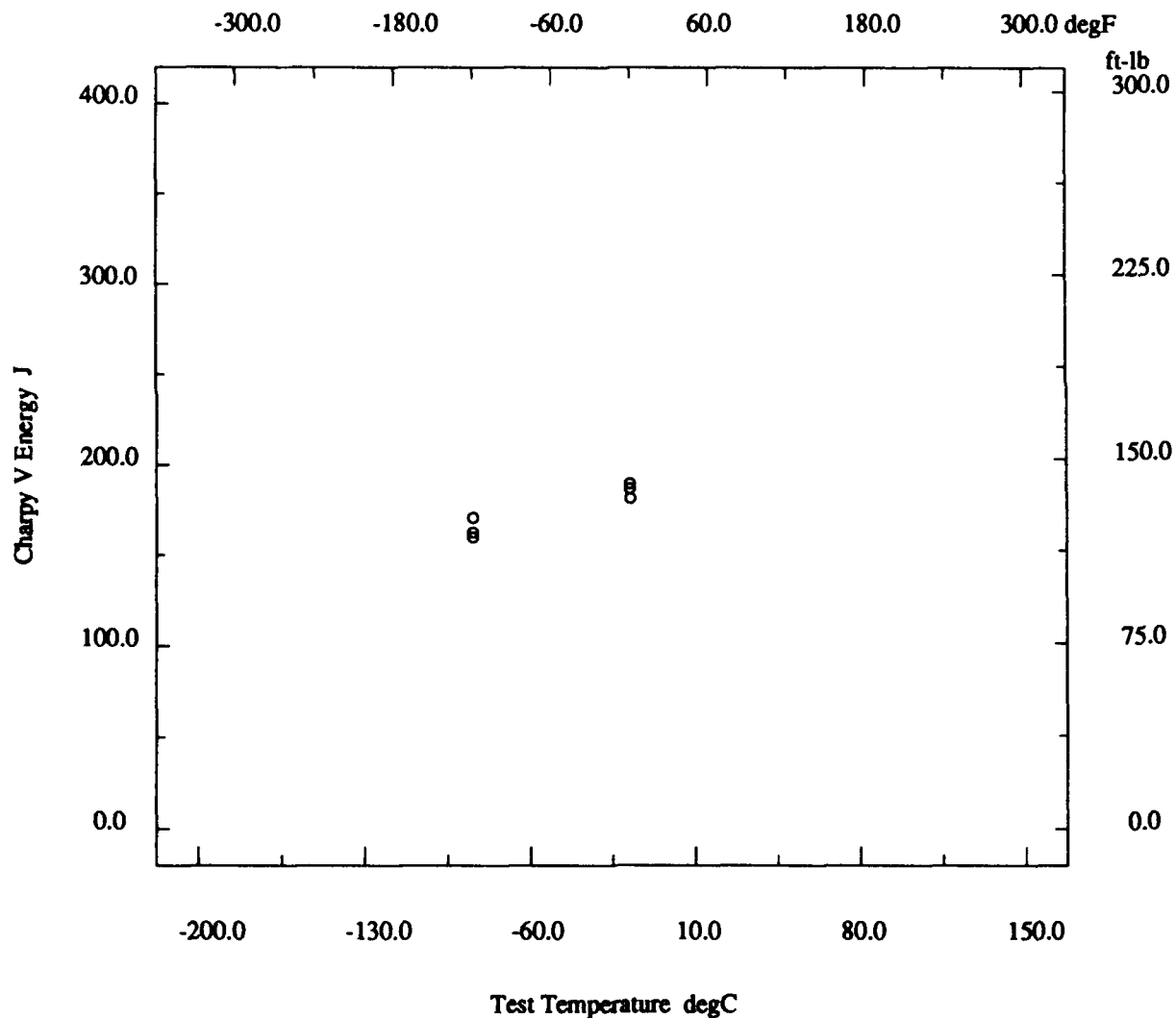
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	118
T-L °	-120	120
T-L °	-120	126
T-L °	0	134
T-L °	0	138
T-L °	0	140

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.19

Description			
Material Code	001.020.01M2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.20

<b>Description</b>	
Material Code .....	001.020.01B1
UNS .....	*
Type .....	Wrought Metal
Thickness .....	3.75 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	B8817-1
<b>Composition</b>	
See Page 18400.1	
<b>Fabrication History</b>	
Heat Treatment .....	A,Q,T
Year Produced .....	1982
Source .....	*
Ingot Position .....	Bottom
Process Temperature .....	1650 degF
Rolling Conditions .....	91 %
Final Temperature .....	1140 degF
Cold Work Strain .....	*
Aging Time .....	*
Producer .....	*
Addl Info .....	No
Melting Practice .....	*
Killing Process .....	*
Process Time .....	5.83 hr
Final Processing .....	A,Q,T
Final Time .....	4.83 hr
Aging Temperature .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Specimen Type .....	*
Gage Length .....	*
Tensile Strength Offset .....	*
Tensile Modulus .....	*
Standard Year .....	*
Position .....	1/4T
Specimen Thickness .....	*
Loading Rate .....	*
Uniform Elongation .....	*
Standard Method .....	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	116.7	101.2	*	20	68.5

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.21

<b>Description</b>	
Material Code .....	001.020.01B1
UNS .....	*
Type .....	Wrought Metal
Thickness .....	3.75 in
Composition Position .....	Ladle
Reference .....	USN-1
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	B8817-1
<b>Composition</b>	
See Page 18400.1	
<b>Fabrication History</b>	
See Page 18400.20	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	1/4T
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	106
T-L °	-120	108
T-L °	-120	110
T-L °	0	124
T-L °	0	128
T-L °	0	128

\* - not reported

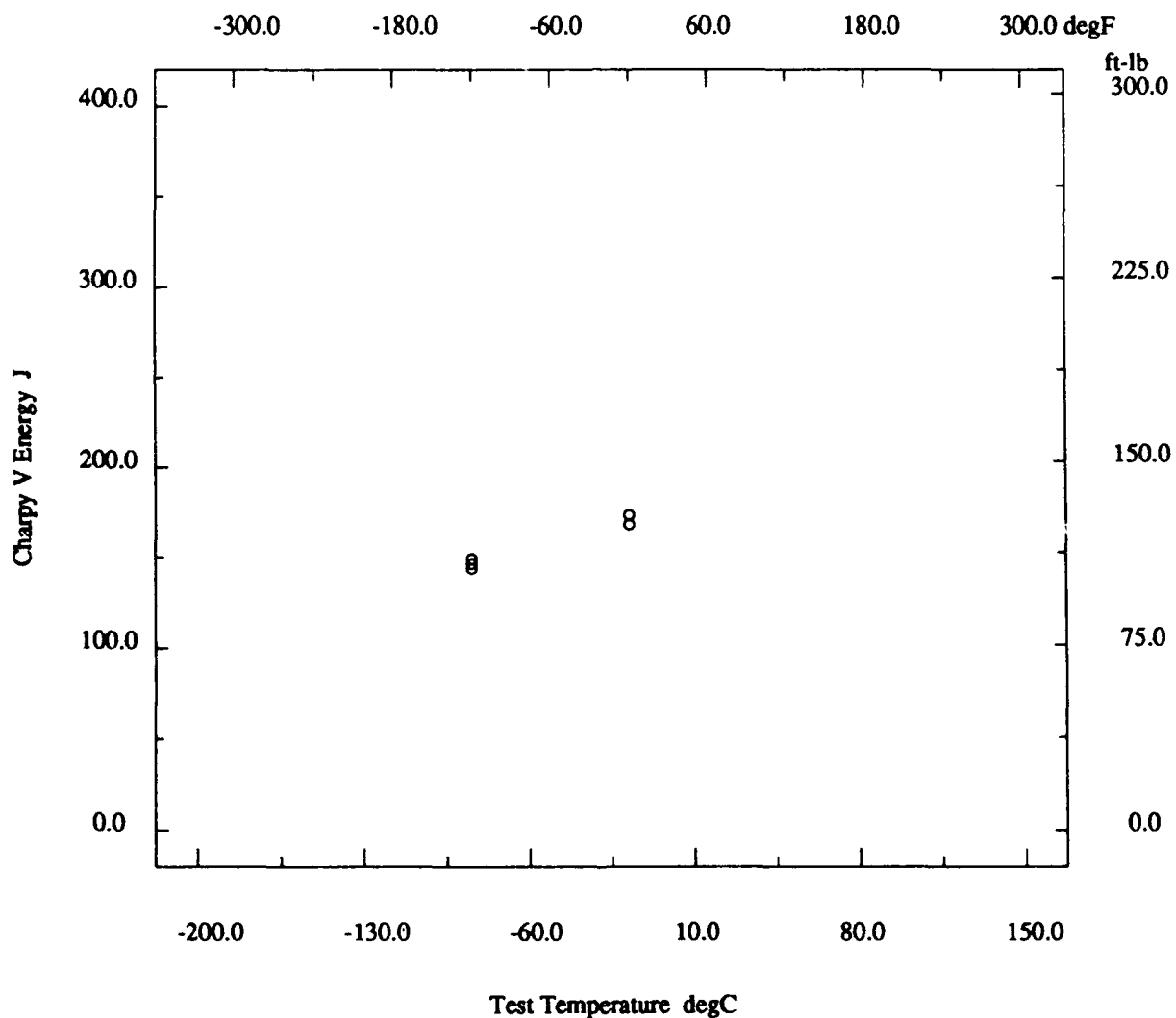


# Marine Structural Toughness Data Bank

Material HY80

Page 18400.22

<b>Description</b>			
Material Code	001.020.01B1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.23

<b>Description</b>						
Material Code	001.020.01BM	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	3.75 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	B8817-1			
Reference	USN-1					
<b>Composition</b>		See Page 18400.1				
<b>Fabrication History</b>		See Page 18400.20				
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp	UTS	TYS	TYP	Elongation	RA
	degF	ksi	ksi	ksi	%	%
T	Room	115.4	100.9	*	23	71.6

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.24

<b>Description</b>			
Material Code	001.020.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		

<b>Composition</b>	See Page 18400.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18400.20
----------------------------	-------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	110
T-L °	-120	110
T-L °	-120	110
T-L °	0	124
T-L °	0	130
T-L °	0	132

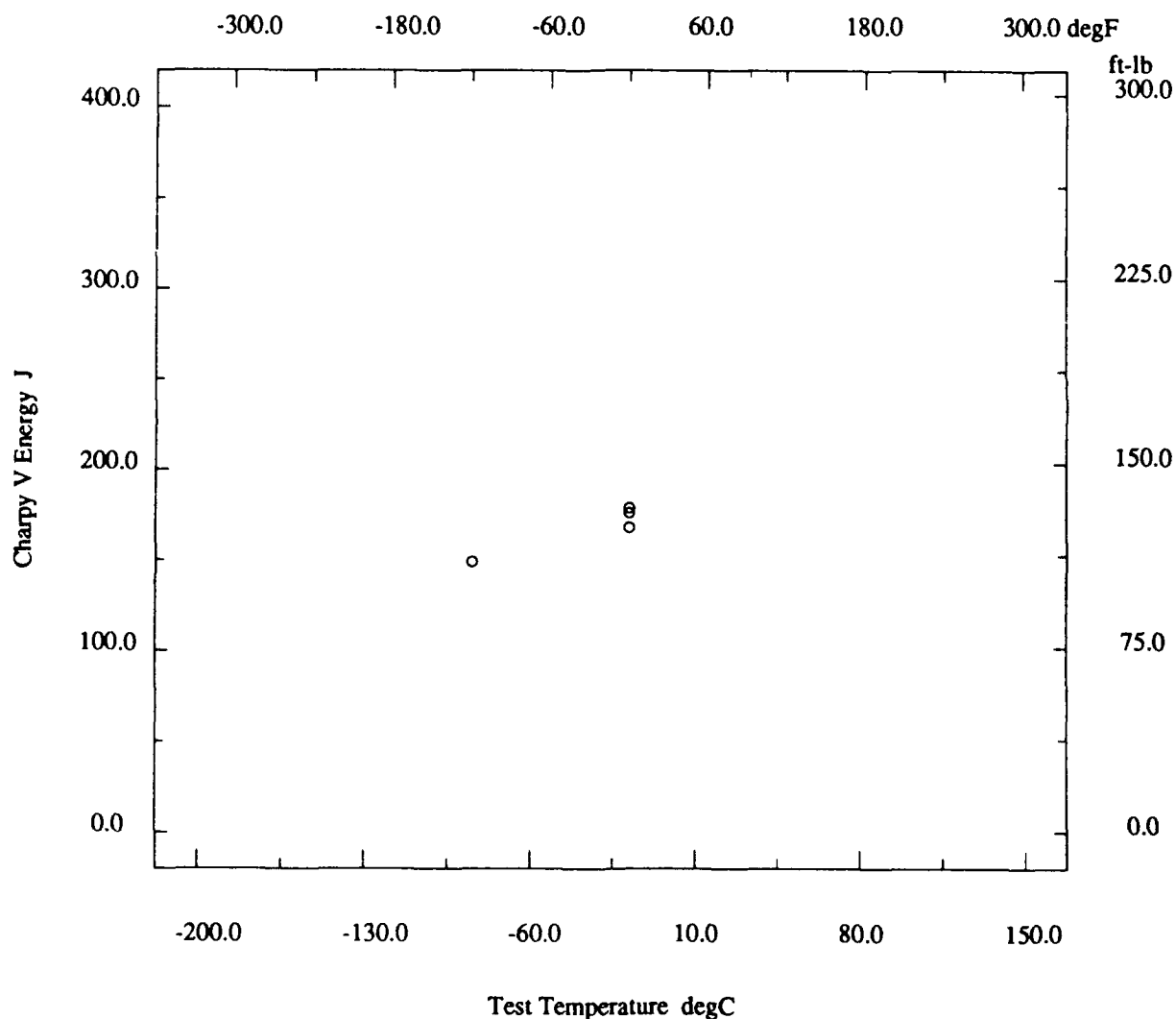
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.25

<b>Description</b>			
Material Code	001.020.01BM	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.26

<b>Description</b>	
Material Code	001.020.01B2
UNS	*
Type	Wrought Metal
Thickness	3.75 in
Composition Position	Ladle
Reference	USN-1
<b>Composition</b>	
See Page 18400.1	
<b>Fabrication History</b>	
See Page 18400.20	
<b>Property Measurements</b>	
Test Type	Tensile
Specimen Type	*
Gage Length	*
Tensile Strength Offset	*
Tensile Modulus	*
Standard Year	*
Position	1/4T
Specimen Thickness	*
Loading Rate	*
Uniform Elongation	*
Standard Method	*

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	116.5	102.1	*	21	67.0

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18400.27

<b>Description</b>		
Material Code	001.020.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	3.75 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	B8817-1

<b>Composition</b>	See Page 18400.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18400.20
----------------------------	-------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	*	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◊	-120	116
T-L ◊	-120	118
T-L ◊	-120	118
T-L ◊	0	130
T-L ◊	0	130
T-L ◊	0	132

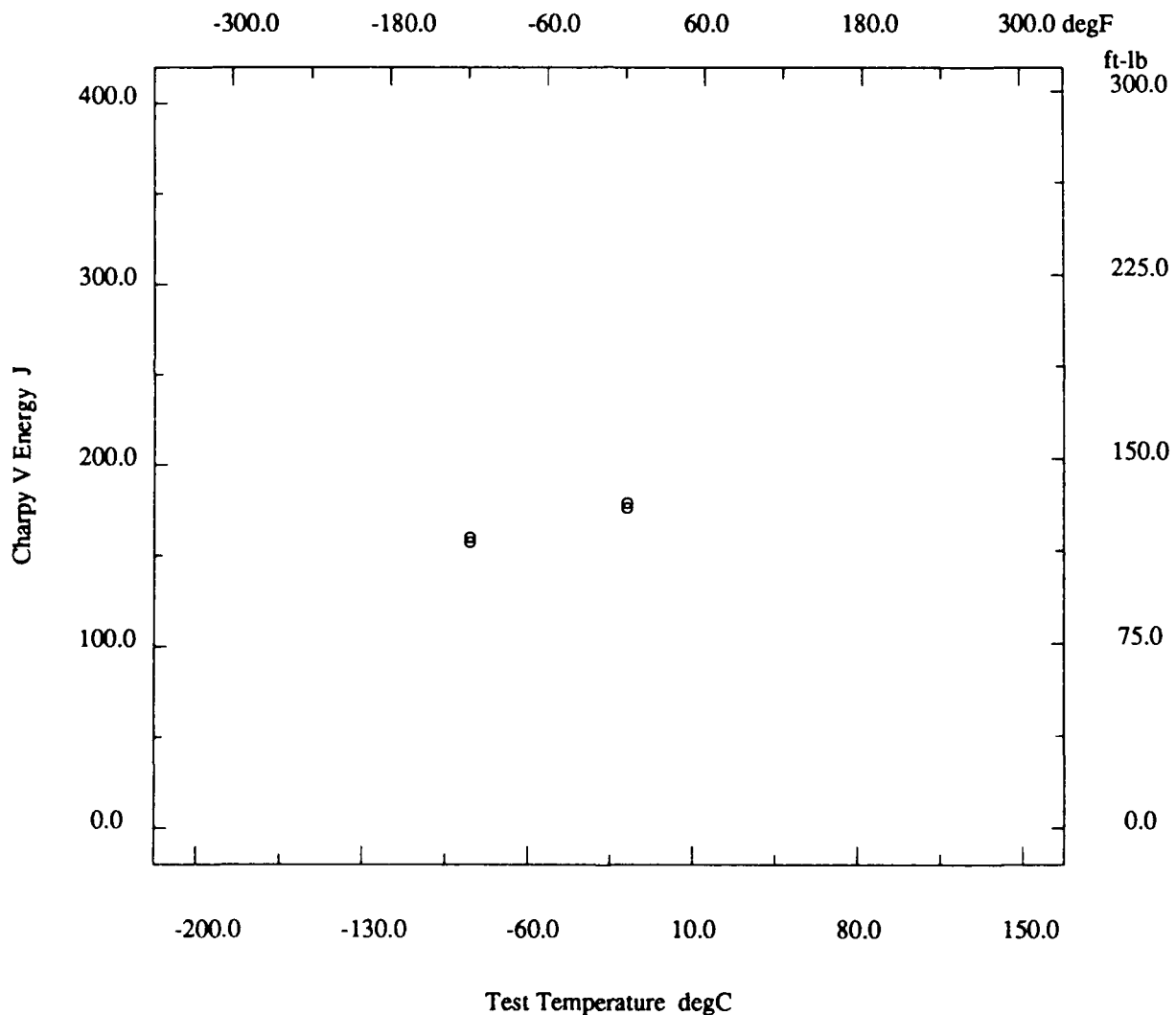
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# Marine Structural Toughness Data Bank

Material HY80

Page 18400.28

Description			
Material Code	001.020.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	3.75 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B8817-1
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18500.1

<b>Description</b>						
Material Code	001.021.01T1	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	1 in	Composition Type	Actual			
Composition Position	Ladle	Lot ID	C4771-39A			
Reference	USN-1					
<b>Composition</b>						
C	0.15 %	Mn	0.26 %			
P	0.009 %	S	0.016 %			
Si	0.22 %	Cr	1.31 %			
Ni	2.43 %	Mo	0.24 %			
V	0.006 %	Cu	0.14 %			
Cb	*	Ti	0.002 %			
B	*	Al	0.025 %			
N	*	Other Components	As=0.006;Sn=0.013;Sb=0.008 %			
<b>Fabrication History</b>						
Heat Treatment	A,Q,T	Producer	*			
Year Produced	1982	Addl Info	No			
Source	*	Melting Practice	*			
Ingot Position	Top	Killing Process	*			
Process Temperature	1660 degF	Process Time	0.75 hr			
Rolling Conditions	89 %	Final Processing	A,Q,T			
Final Temperature	1260 degF	Final Time	0.75 hr			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
<b>Property Measurements</b>						
Test Type	Tensile	Position	1/4T			
Specimen Type	*	Specimen Thickness	*			
Gage Length	*	Loading Rate	*			
Tensile Strength Offset	*	Uniform Elongation	*			
Tensile Modulus	*	Standard Method	*			
Standard Year	*					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	102.5	86.2	*	22	63.3



# Marine Structural Toughness Data Bank

Material HY80

Page 18500.2

<b>Description</b>	
Material Code .....	001.021.01T1
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	1 in
Composition Type .....	Actual
Composition Position .....	Ladle
Lot ID .....	C4771-39A
Reference .....	USN-1
<b>Composition</b>	
See Page 18500.1	
<b>Fabrication History</b>	
See Page 18500.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	1/4T
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	*
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
L-T °	-120	125
L-T °	-120	137
L-T °	-120	139
L-T °	-120	143
L-T °	-120	159
L-T °	-40	132
L-T °	-40	141
L-T °	-40	144
L-T °	-40	145
L-T °	-40	167
L-T °	0	135
L-T °	0	143
L-T °	0	143
L-T °	0	146
L-T °	0	148
L-T °	32	148
L-T °	32	152
L-T °	32	154
L-T °	32	157
L-T °	32	189
L-T °	70	142
L-T °	70	144
L-T °	70	152
L-T °	70	153
L-T °	70	158
T-L ^	-120	71
T-L ^	-120	78
T-L ^	-120	84
T-L ^	-120	85
T-L ^	-120	88
T-L ^	-40	100
T-L ^	-40	106
T-L ^	-40	89

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY80

Page 18500.3

(continued)

Orien	Test Temp degF	CVN Energy ft-lb
T-L ▲	-40	91
T-L ▲	-40	97
T-L ▲	0	101
T-L ▲	0	104
T-L ▲	0	78
T-L ▲	0	81
T-L ▲	0	86
T-L ▲	32	86
T-L ▲	32	89
T-L ▲	32	92
T-L ▲	32	92
T-L ▲	32	92
T-L ▲	32	92
T-L ▲	70	102
T-L ▲	70	108
T-L ▲	70	89
T-L ▲	70	92
T-L ▲	70	98

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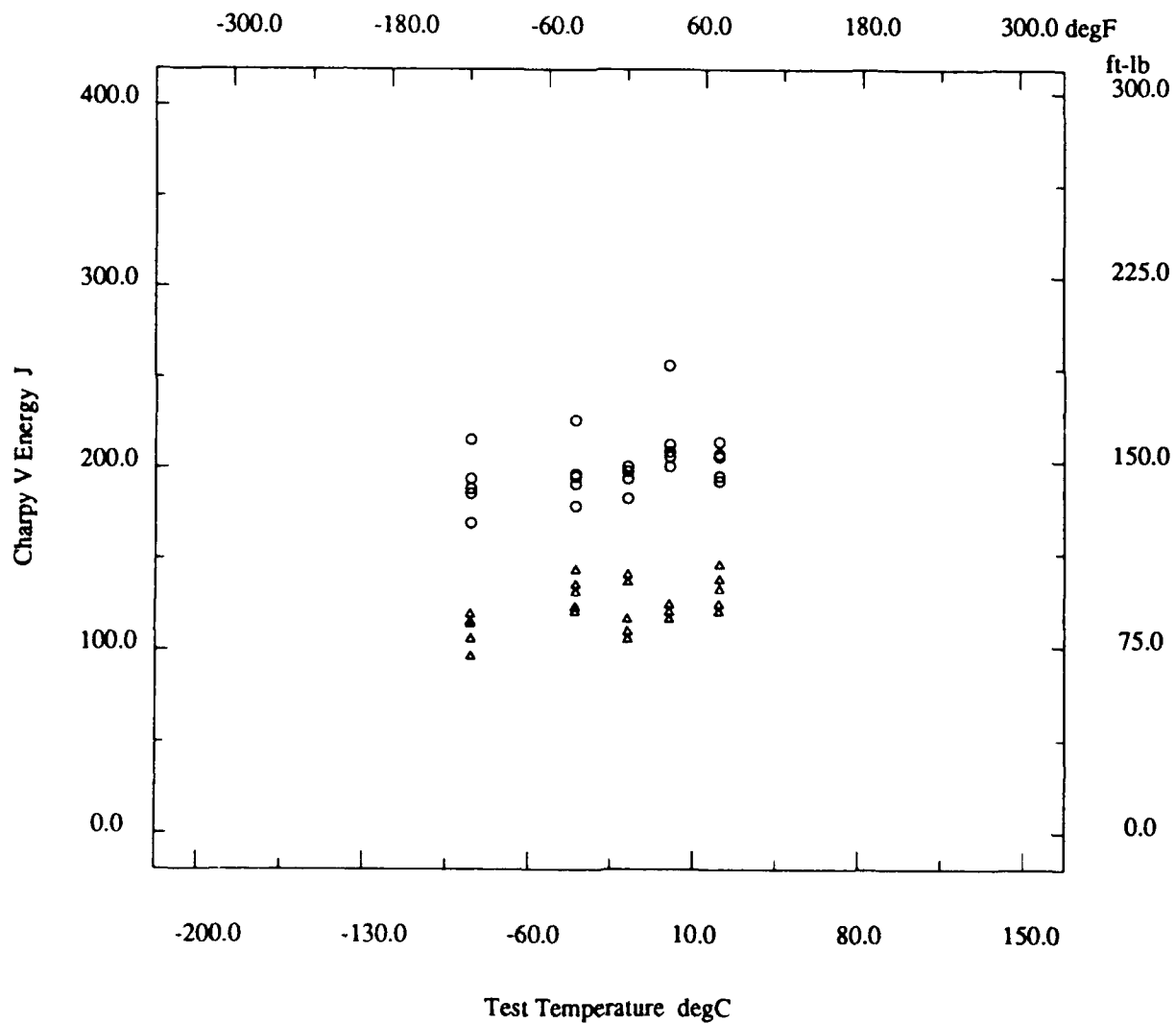
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18500.4

Description			
Material Code	001.021.01T1	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	C4771-39A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18500.5

<b>Description</b>		
Material Code	001.021.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	C4771-39A

<b>Composition</b>	See Page 18500.1
--------------------	------------------

<b>Fabrication History</b>		
Heat Treatment	A,Q,T	Producer
Year Produced	1982	Addl Info
Source	*	Melting Practice
Ingot Position	Bottom	Killing Process
Process Temperature	1660 degF	Process Time
Rolling Conditions	89 %	Final Processing
Final Temperature	1260 degF	Final Time
Cold Work Strain	*	Aging Temperature
Aging Time	*	Location

<b>Property Measurements</b>		
Test Type	Tensile	Position
Specimen Type	*	Specimen Thickness
Gage Length	*	Loading Rate
Tensile Strength Offset	*	Uniform Elongation
Tensile Modulus	*	Standard Method
Standard Year	*	

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	103.5	87.8	*	22	62.7

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18500.6

<b>Description</b>		
Material Code	001.021.01B2	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1 in	Composition Type
Composition Position	Ladle	Lot ID
Reference	USN-1	C4771-39A

**Composition** See Page 18500.1

**Fabrication History** See Page 18500.5

## Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	70
T-L °	-120	74
T-L °	-120	79
T-L °	0	87
T-L °	0	94
T-L °	0	96

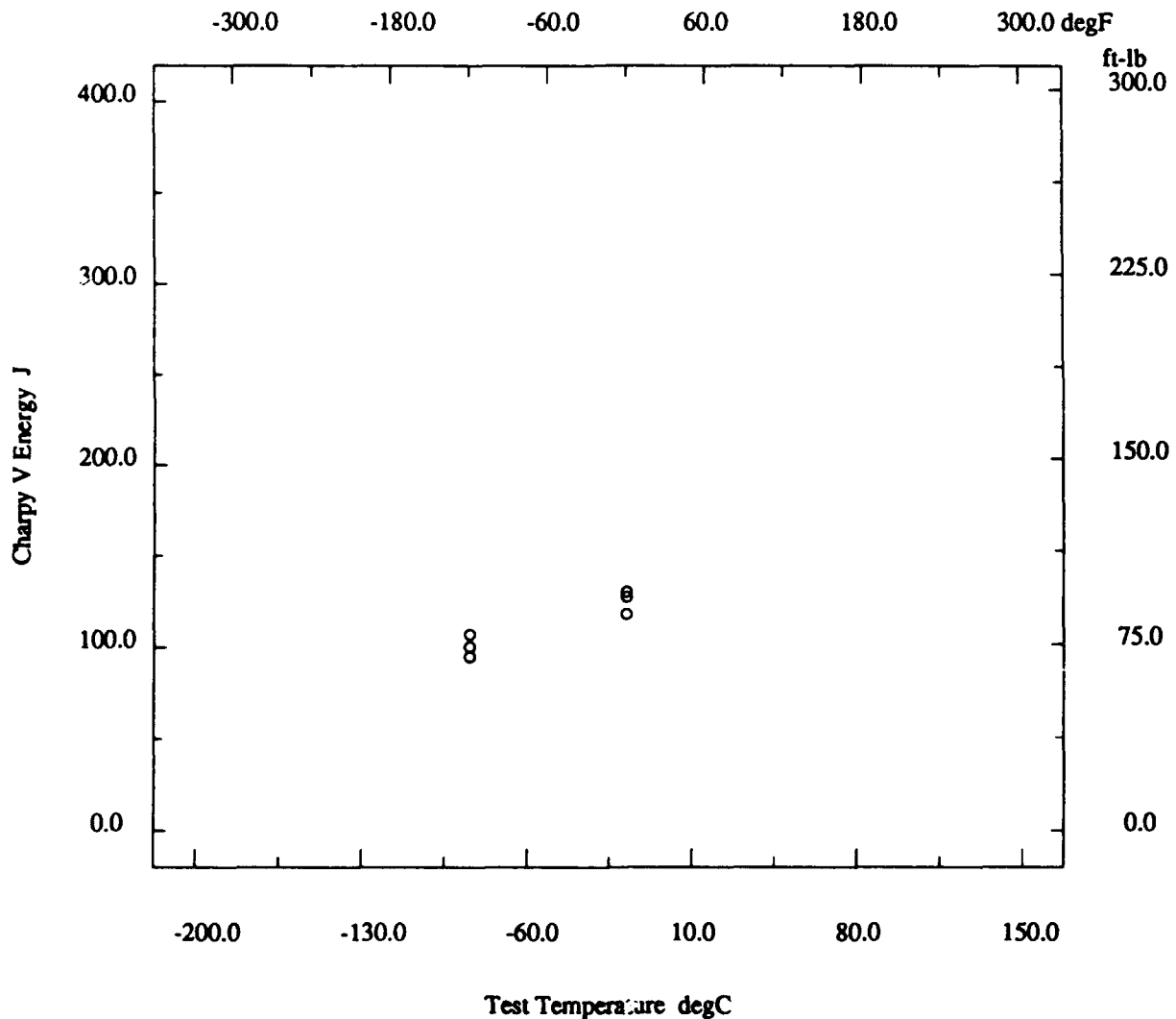
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18500.7

Description			
Material Code	001.021.01B2	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	C4771-39A
Reference	USN-1		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18600.1

<b>Description</b>			
Material Code	001.023.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B1038-2B
Reference	USN 6/9		
<b>Composition</b>			
C	0.17 %	Mn	0.33 %
P	0.006 %	S	0.006 %
Si	*	Cr	1.21 %
Ni	2.88 %	Mo	0.24 %
V	<0.001 %	Cu	0.11 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	Q,T	Producer	*
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	Q,T
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	*
Specimen Type	Cylindrical	Specimen Thickness	0.505 in
Gage Length	2.0 in	Loading Rate	0.002 in/min
Tensile Strength Offset	0.2 %	Uniform Elongation	*
Tensile Modulus	29 ksi*10**3	Standard Method	E 8
Standard Year	1969		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	99.8	80.0	*	28	70

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18600.2

<b>Description</b>	
Material Code .....	001.023.01
UNS .....	*
Type .....	Wrought Metal
Thickness .....	2.0 in
Composition Position .....	*
Reference .....	USN 6/9
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	B1038-2B
<b>Composition</b>	
See Page 18600.1	
<b>Fabrication History</b>	
See Page 18600.1	
<b>Property Measurements</b>	
Test Type .....	Fracture Toughness
Specimen Type .....	Compact Tension
Crack Length .....	*
Loading Rate .....	*
KIc .....	*
Reason for Invalid .....	*
JIcpr .....	Modified Standard
Critical COD .....	*
Initial JI, JI .....	*
Standard Method .....	813
Position .....	*
Specimen Thickness .....	1.0 in
Loading Type .....	I
KQ .....	*
Valid KIc? .....	*
KJc .....	*
Initial COD .....	*
Curve Shape .....	*
Maximum J, Jmax .....	*
Standard Year .....	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	1131	63
T-L	Room	1186	46
T-L	Room	633	65
T-L	Room	854	75



# Marine Structural Toughness Data Bank

Material HY80

Page 18600.3

<b>Description</b>		
Material Code	001.023.01	Material Name HY80
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	2.0 in	Composition Type Actual
Composition Position	*	Lot ID B1038-2B
Reference	USN 6/9	
<b>Composition</b>		See Page 18600.1
<b>Fabrication History</b>		See Page 18600.1
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position *
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method E 23
Standard Year	1972	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	57
T-L °	-120	75

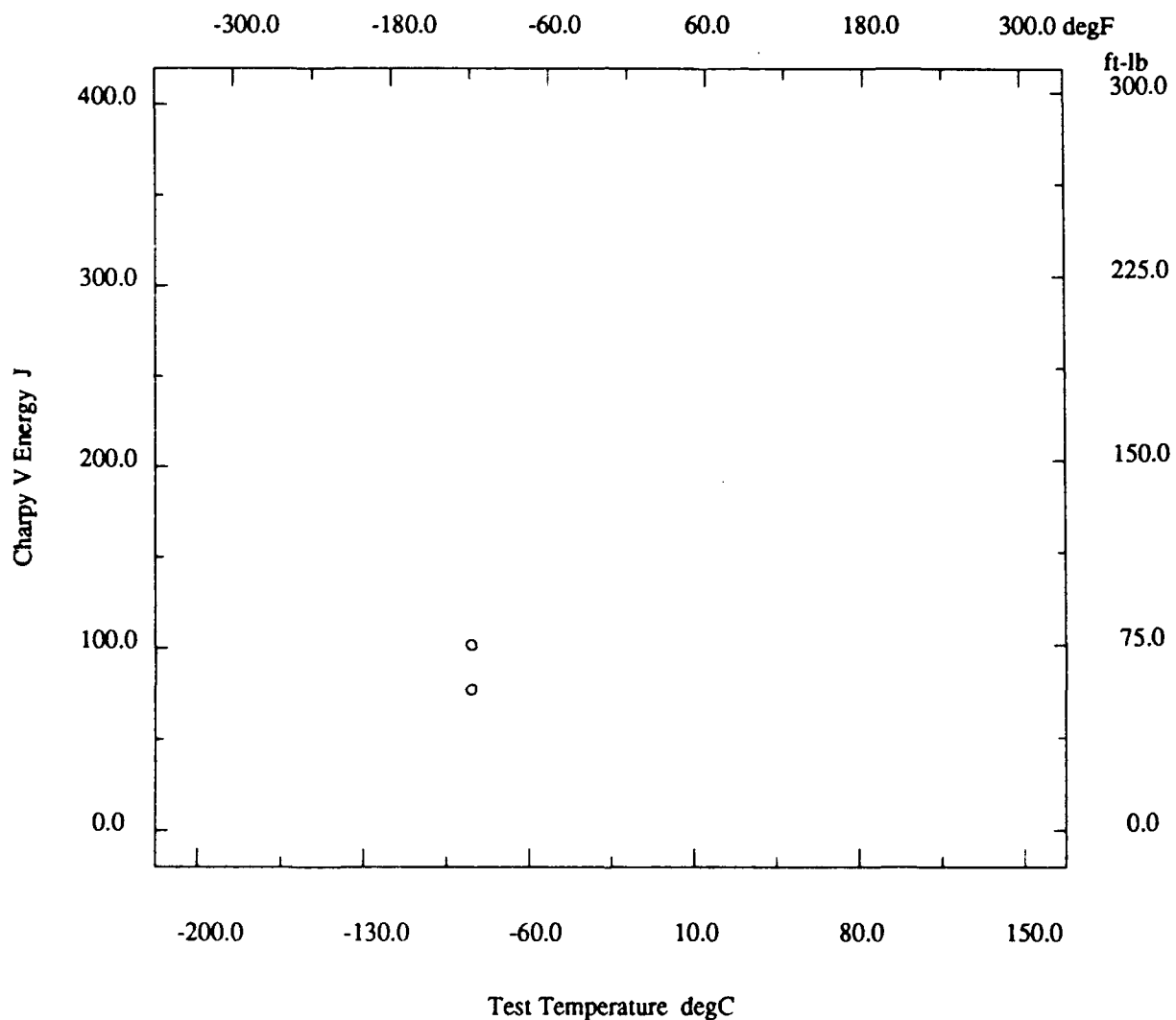
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18600.4

Description			
Material Code	001.023.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B1038-2B
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18600.5

<b>Description</b>	
Material Code	001.023.01
UNS	*
Type	Wrought Metal
Thickness	2.0 in
Composition Position	*
Reference	USN 6/9
Material Name	HY80
Other Designation	*
Form	Plate
Composition Type	Actual
Lot ID	B1038-2B

<b>Composition</b>	See Page 18600.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18600.1
----------------------------	------------------

<b>Property Measurements</b>	
Test Type	Dynamic Tear
Specimen Type	Dynamic Tear
Specimen Thickness	0.625 in
Appearance	*
Standard Year	1980
Position	*
Notch Preparation	Pressed
Loading Rate	*
Standard Method	E 604

Orien	Test Temp degF	DT Energy ft-lb
T-L °	0	700
T-L °	0	825

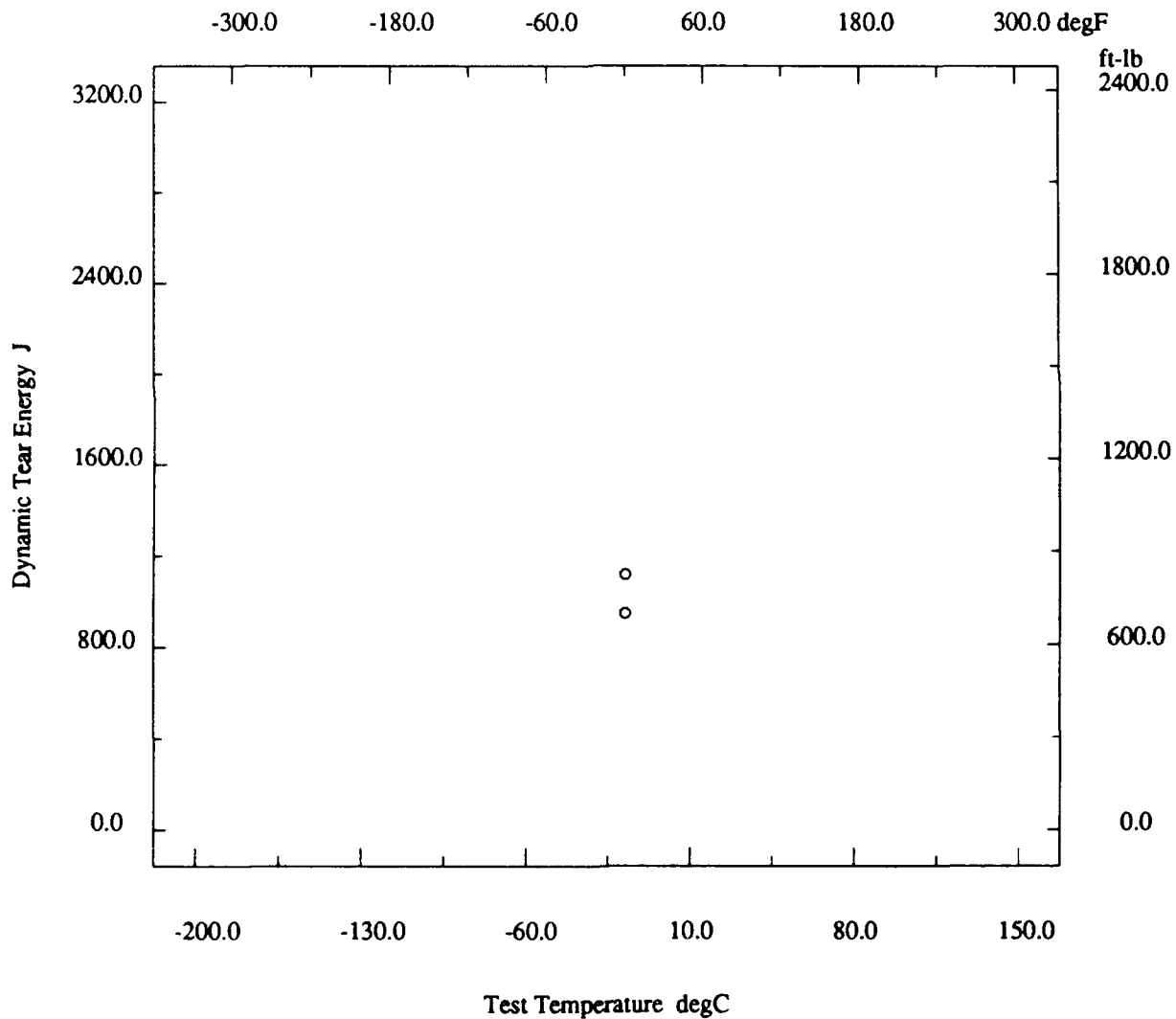
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18600.6

Description			
Material Code	001.023.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B1038-2B
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18700.1

<b>Description</b>			
Material Code	001.024.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.0 in	Composition Type	Actual
Composition Position	*	Lot ID	C-9283-11
Reference	USN 6/9		

<b>Composition</b>			
C	0.17 %	Mn	0.28 %
P	0.011 %	S	0.011 %
Si	*	Cr	1.19 %
Ni	1.96 %	Mo	0.25 %
V	<0.001 %	Cu	0.11 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %

<b>Fabrication History</b>			
Heat Treatment	Q,T	Producer	*
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	Q,T
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in <sup>2</sup>	Tear Mod in-lb/in**2
T-L	Room	627	56
T-L	Room	678	63
T-L	Room	890	57

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18700.2

<b>Description</b>			
Material Code	001.024.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.0 in	Composition Type	Actual
Composition Position	*	Lot ID	C-9283-11
Reference	USN 6/9		
<b>Composition</b>		See Page 18700.1	
<b>Fabrication History</b>		See Page 18700.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	*
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	E 23
Standard Year	1972		

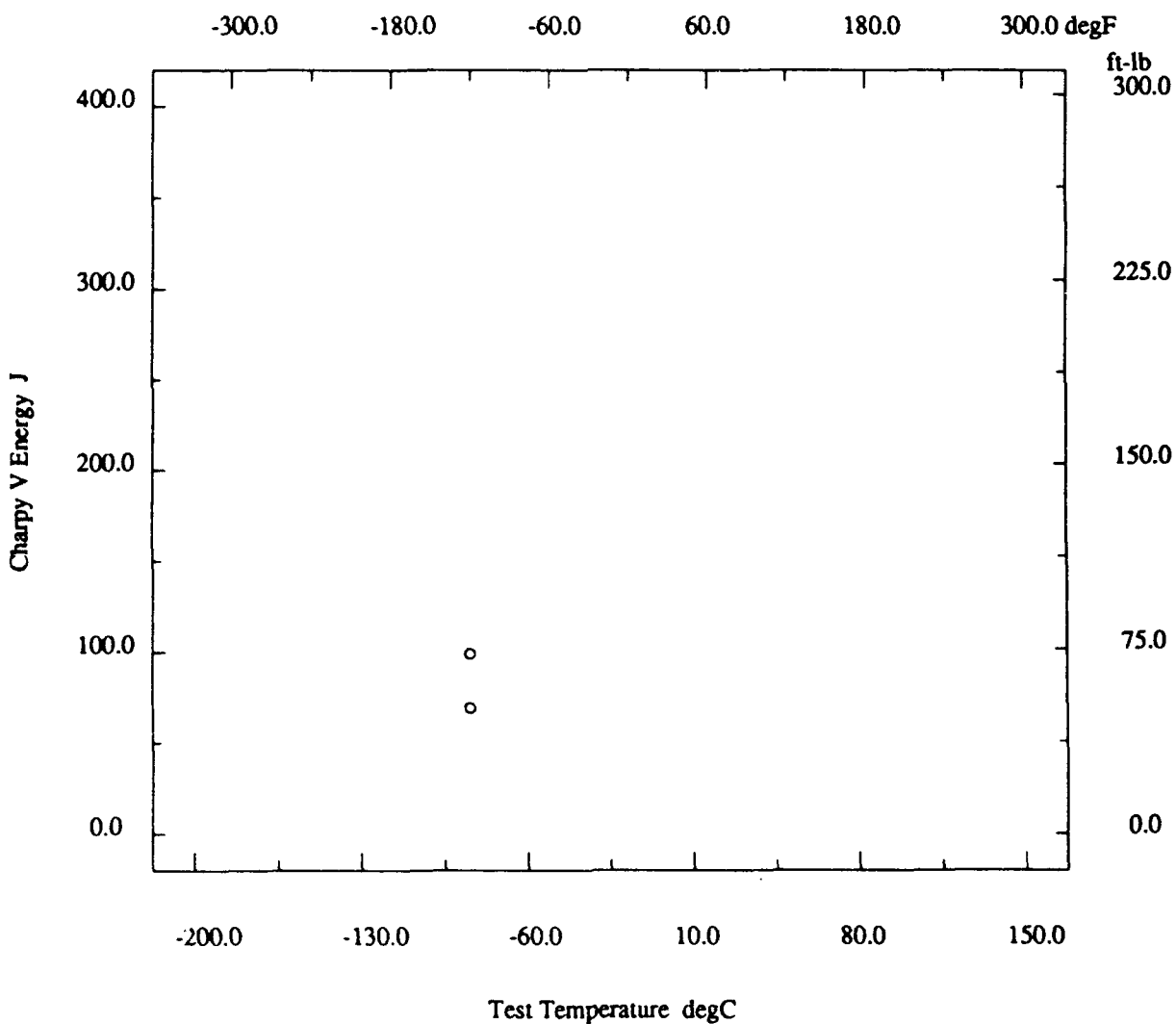
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	51
T-L °	-120	73

# Marine Structural Toughness Data Bank

Material HY80

Page 18700.3

Description			
Material Code	001.024.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.0 in	Composition Type	Actual
Composition Position	*	Lot ID	C-9283-11
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18700.4

<b>Description</b>		
Material Code	001.024.01	Material Name
UNS	*	Other Designation
Type	Wrought Metal	Form
Thickness	1.0 in	Composition Type
Composition Position	*	Lot ID
Reference	USN 6/9	
<b>Composition</b>		See Page 18700.1
<b>Fabrication History</b>		See Page 18700.1
<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position
Specimen Type	Dynamic Tear	Notch Preparation
Specimen Thickness	0.625 in	Loading Rate
Appearance	*	Standard Method
Standard Year	1980	

Orien	Test Temp degF	DT Energy ft-lb
T-L ◦	0	700
T-L ◦	0	800

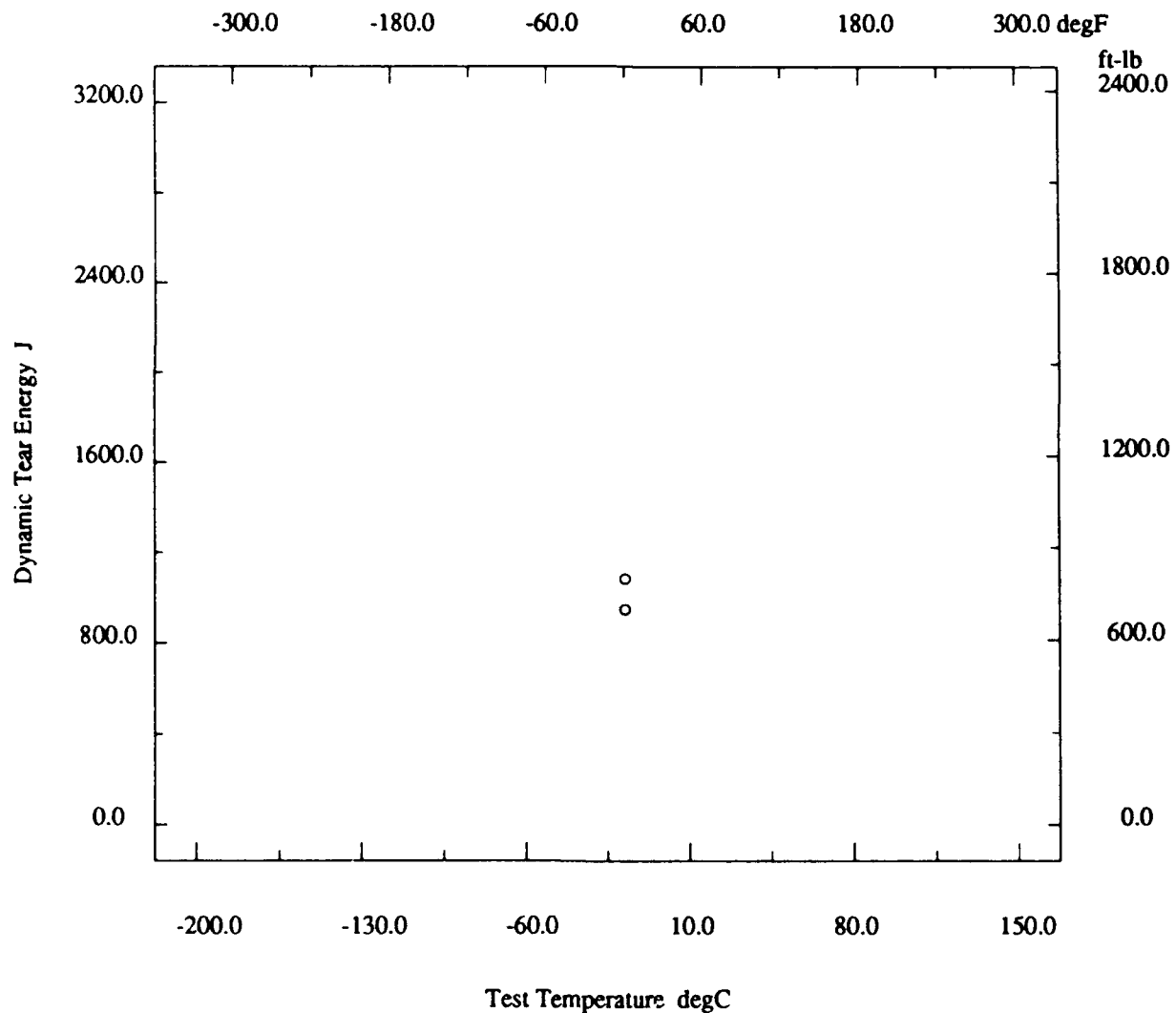


# Marine Structural Toughness Data Bank

Material HY80

Page 18700.5

Description			
Material Code	001.024.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	1.0 in	Composition Type	Actual
Composition Position	*	Lot ID	C-9283-11
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18800.1

<b>Description</b>						
Material Code	001.025.01	Material Name	HY80			
UNS	*	Other Designation	*			
Type	Wrought Metal	Form	Plate			
Thickness	2.0 in	Composition Type	Actual			
Composition Position	*	Lot ID	B-1088-3			
Reference	USN 6/9					
<b>Composition</b>						
C	0.16 %	Mn	0.25 %			
P	0.017 %	S	0.015 %			
Si	*	Cr	1.42 %			
Ni	2.40 %	Mo	0.30 %			
V	<0.001 %	Cu	0.12 %			
Cb	*	Ti	<0.01 %			
B	*	Al	*			
N	*	Other Components	None %			
<b>Fabrication History</b>						
Heat Treatment	Q,T	Producer	*			
Year Produced	*	Addl Info	None			
Source	USN	Melting Practice	*			
Ingot Position	*	Killing Process	*			
Process Temperature	*	Process Time	*			
Rolling Conditions	*	Final Processing	Q,T			
Final Temperature	*	Final Time	*			
Cold Work Strain	*	Aging Temperature	*			
Aging Time	*	Location	*			
<b>Property Measurements</b>						
Test Type	Tensile	Position	*			
Specimen Type	Cylindrical	Specimen Thickness	0.505 in			
Gage Length	2.0 in	Loading Rate	0.002 in/min			
Tensile Strength Offset	0.2 %	Uniform Elongation	*			
Tensile Modulus	28 ksi*10**3	Standard Method	E 8			
Standard Year	1969					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
T	Room	99.8	78.4	*	27	72

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18800.2

<b>Description</b>			
Material Code	001.025.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-3
Reference	USN 6/9		
<b>Composition</b>		See Page 18800.1	
<b>Fabrication History</b>		See Page 18800.1	
<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in <sup>2</sup>	Tear Mod in-lb/in**2
T-L	Room	1143	91
T-L	Room	1195	92

# Marine Structural Toughness Data Bank

Material HY80

Page 18800.3

<b>Description</b>			
Material Code	001.025.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-3
Reference	USN 6/9		

<b>Composition</b>	See Page 18800.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18800.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	*
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	E 23
Standard Year	1972		

Orien	Test Temp degF	CVN Energy ft-lb
T-L ◦	-120	73
T-L ◦	-120	97

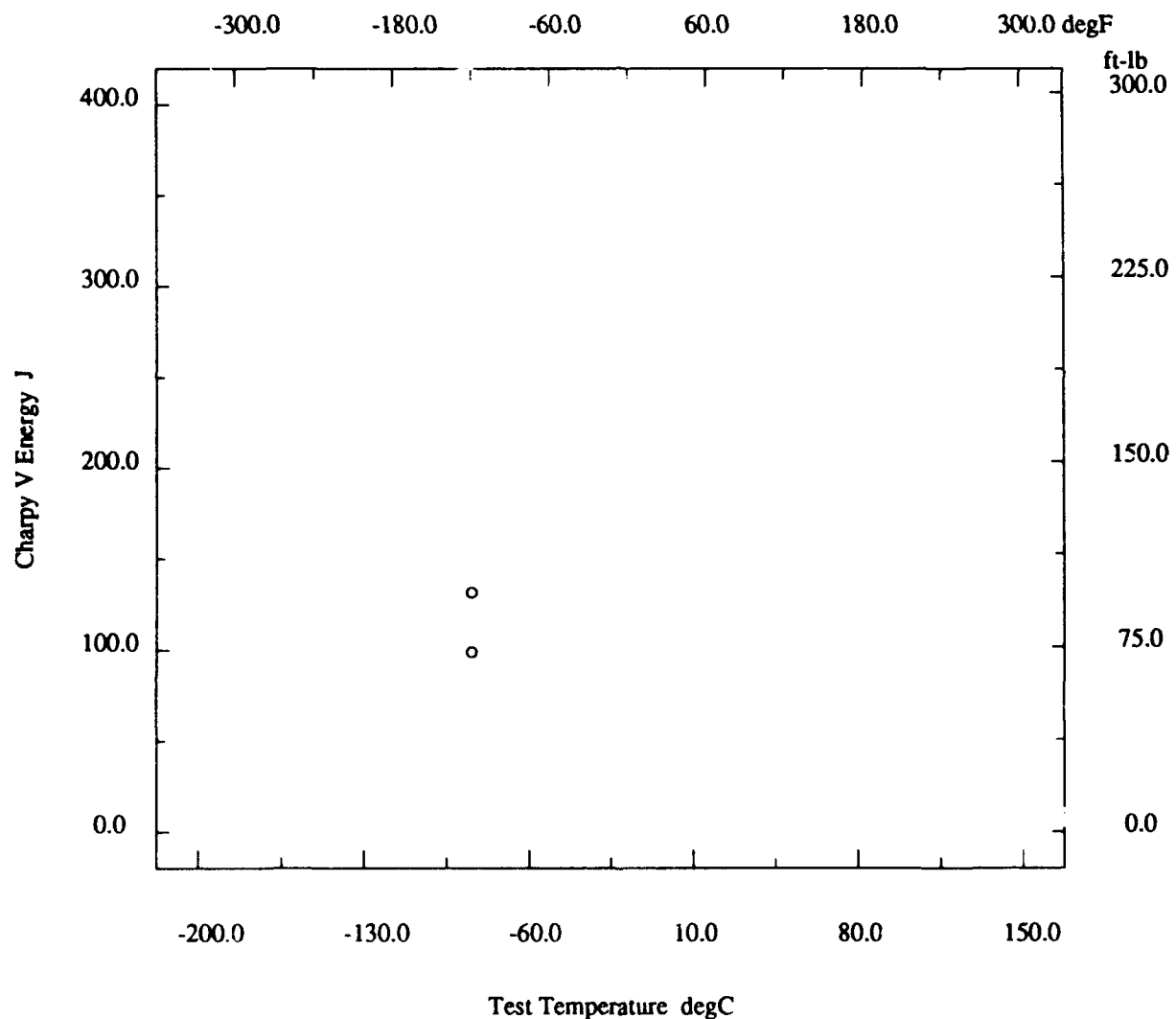
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18800.4

<b>Description</b>			
Material Code	001.025.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-3
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18800.5

<b>Description</b>			
Material Code	001.025.0	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-3
Reference	USN 6/9		
<b>Composition</b>		See Page 18800.1	
<b>Fabrication History</b>		See Page 18800.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	*
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Appearance	*	Standard Method	E 604
Standard Year	1980		

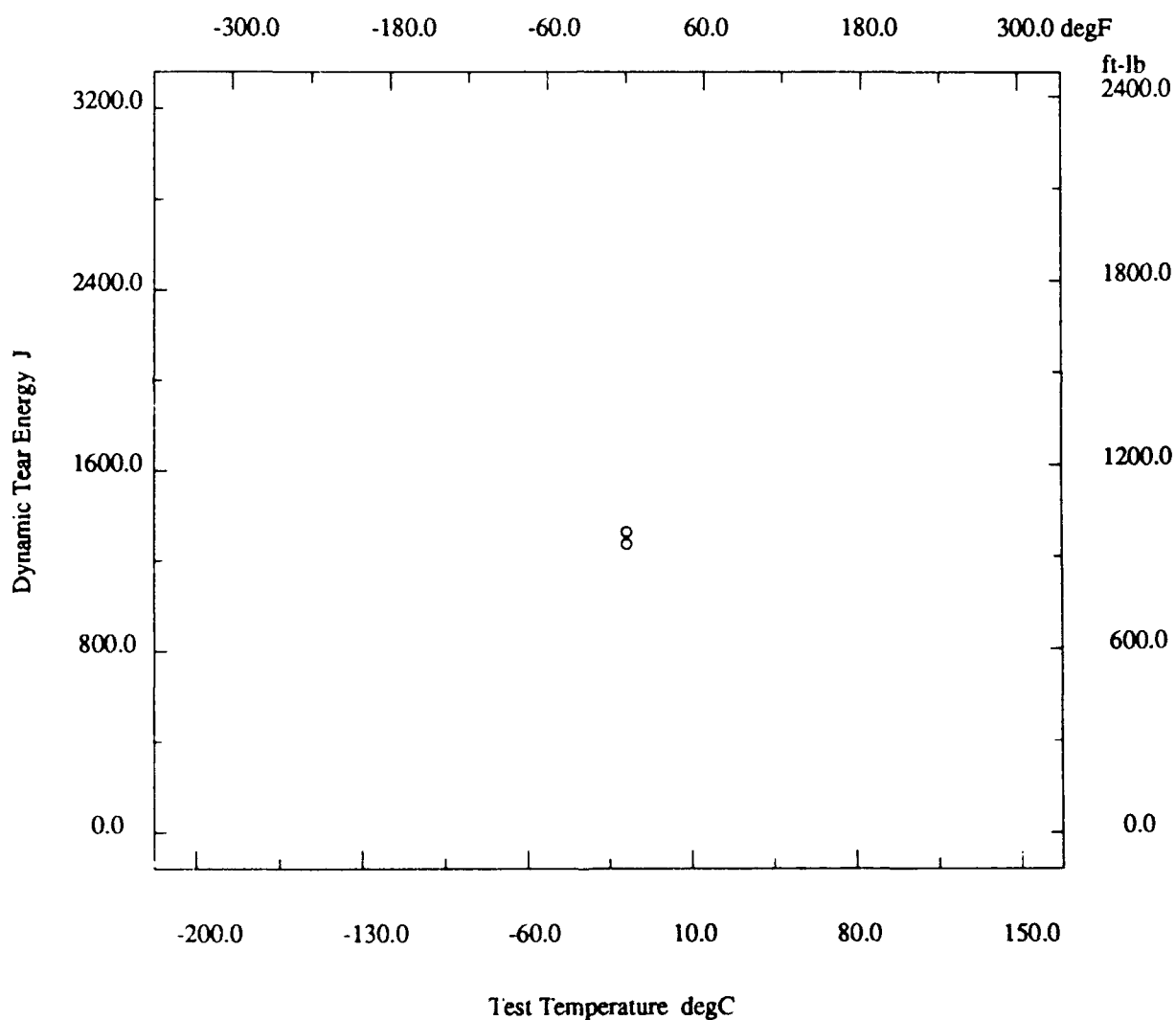
Orien	Test Temp degF	DT Energy ft-lb
T-L °	0	940
T-L °	0	980

# Marine Structural Toughness Data Bank

Material HY80

Page 18800.6

Description			
Material Code	001.025.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-3
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18900.1

<b>Description</b>			
Material Code	001.026.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-5
Reference	USN 6/9		
<b>Composition</b>			
C	0.16 %	Mn	0.28 %
P	0.003 %	S	0.012 %
Si	*	Cr	1.27 %
Ni	2.52 %	Mo	0.29 %
V	<0.001 %	Cu	0.11 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	Q,T	Producer	*
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	Q,T
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Property Measurements</b>			
Test Type	Tensile	Position	*
Specimen Type	Cylindrical	Specimen Thickness	0.505 in
Gage Length	2.0 in	Loading Rate	0.002 in/min
Tensile Strength Offset	0.2 %	Uniform Elongation	*
Tensile Modulus	27 ksi*10**3	Standard Method	E 8
Standard Year	1969		
Orient	Test Temp degF	UTS ksi	TYS ksi
T	Room	99.3	79.2
			TYP ksi
			*
			Elongation %
			27
			RA %
			66

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 18900.2

Description			
Material Code	001.026.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-5
Reference	USN 6/9		
Composition		See Page 18900.1	
Fabrication History		See Page 18900.1	
Property Measurements			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compaci Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	1094	70
T-L	Room.	1217	77
T-L	Room	1282	72

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18900.3

<b>Description</b>	
Material Code .....	001.026.01
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	2.0 in
Composition Type .....	Actual
Composition Position .....	*
Lot ID .....	B-1088-5
Reference .....	USN 6/9
<b>Composition</b>	
See Page 18900.1	
<b>Fabrication History</b>	
See Page 18900.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	*
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	E 23
Standard Year .....	1972

Orien	Test Temp degF	CVN Energy ft-lb
T-L o	-120	102
T-L o	-120	95

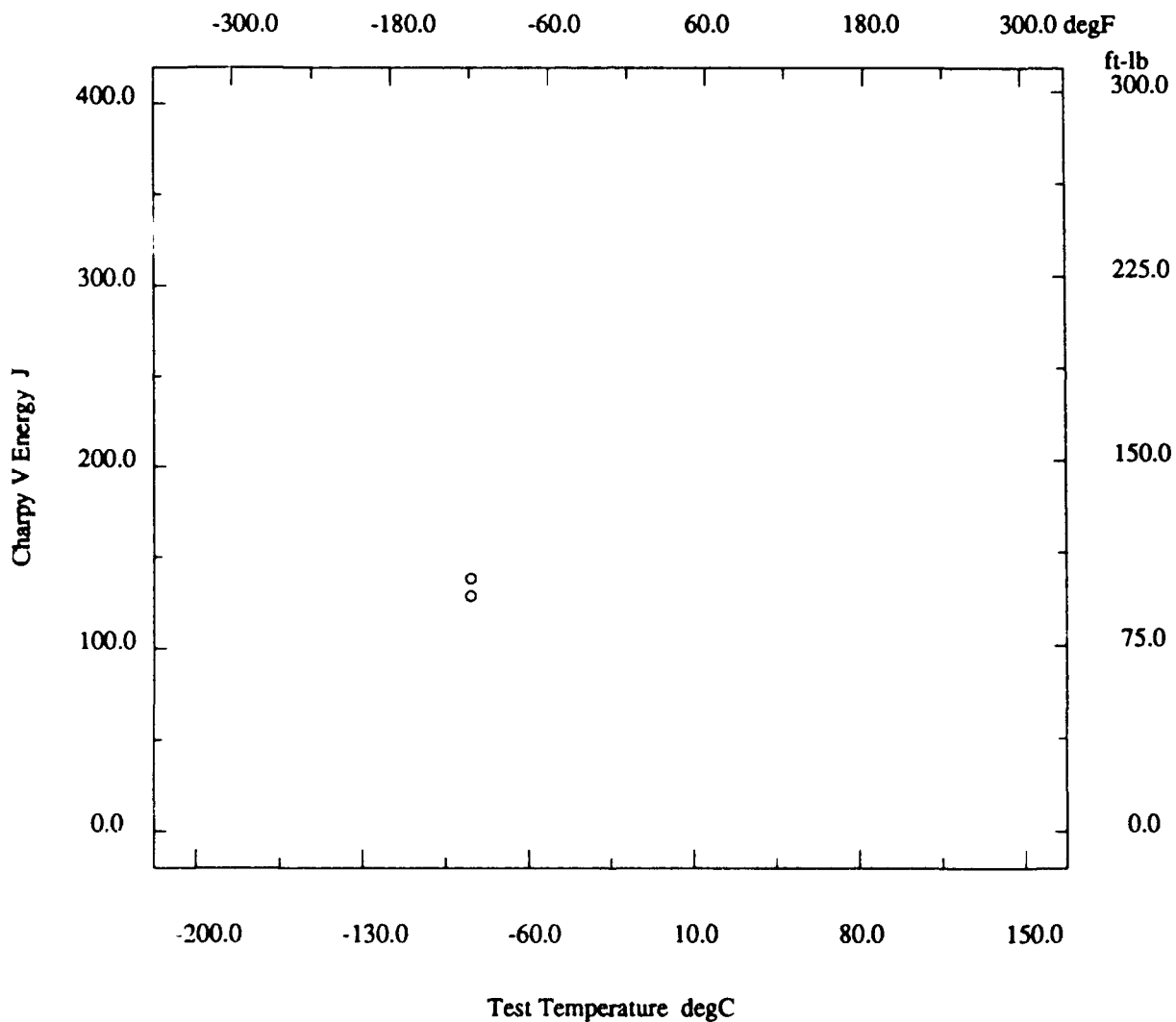
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18900.4

Description			
Material Code	001.026.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-5
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18900.5

<b>Description</b>	
Material Code .....	001.026.01
UNS .....	*
Type .....	Wrought Metal
Thickness .....	2.0 in
Composition Position .....	*
Reference .....	USN 6/9
Material Name .....	HY80
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	B-1088-5

<b>Composition</b>	See Page 18900.1
--------------------	------------------

<b>Fabrication History</b>	See Page 18900.1
----------------------------	------------------

<b>Property Measurements</b>	
Test Type .....	Dynamic Tear
Specimen Type .....	Dynamic Tear
Specimen Thickness .....	0.625 in
Appearance .....	*
Standard Year .....	1980
Position .....	*
Notch Preparation .....	Pressed
Loading Rate .....	*
Standard Method .....	E 604

Orien	Test Temp degF	DT Energy ft-lb
T-L ◯	0	120
T-L ◯	0	910

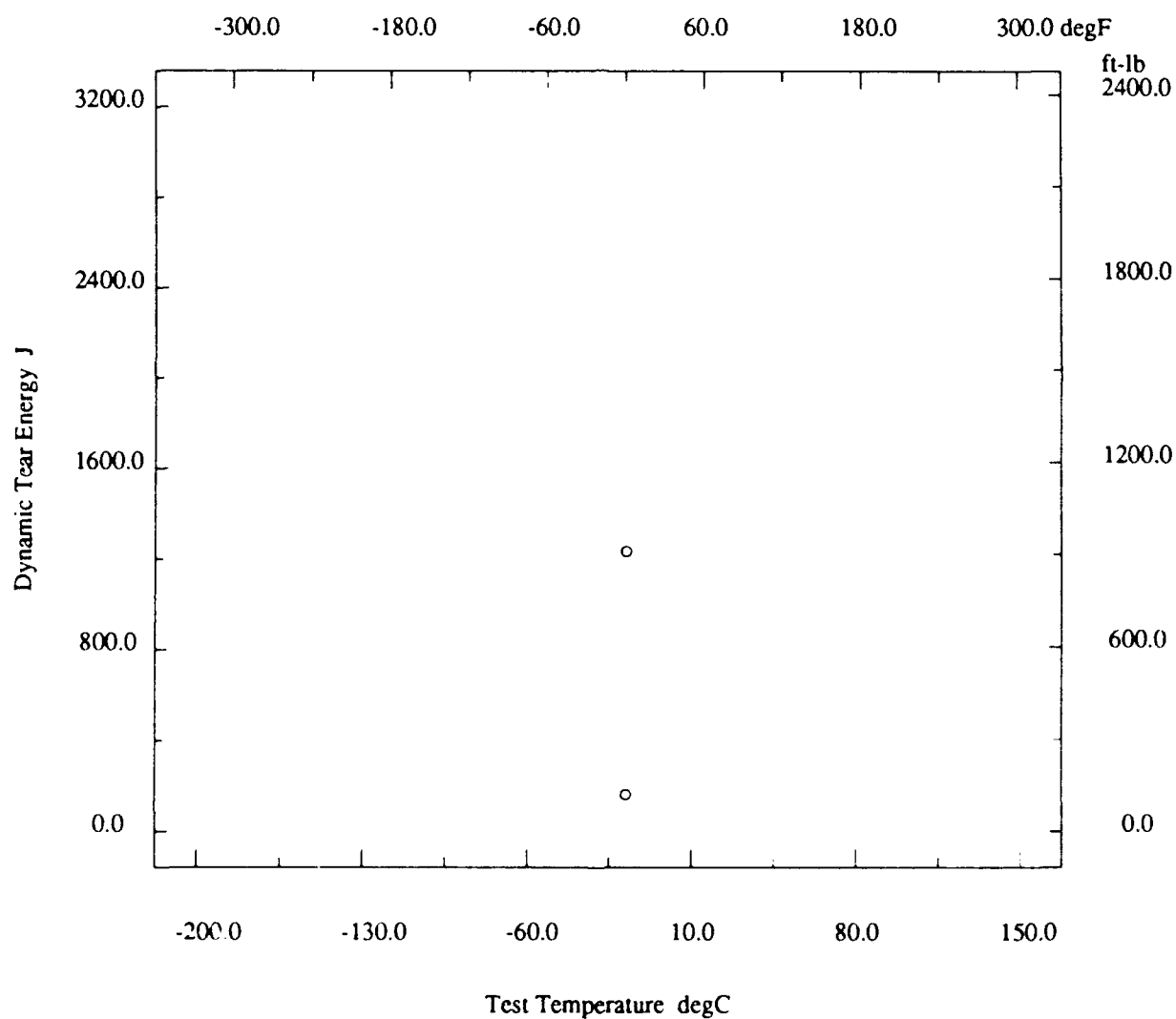
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 18900.6

Description			
Material Code	001.026.01	Material Name	HY80
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	B-1088-5
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19000.1

<b>Description</b>			
Material Code	001.027.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRM
Reference	USN 6/9		
<b>Composition</b>			
C	0.07 %	Mn	1.77 %
P	0.016 %	S	0.005 %
Si	*	Cr	0.33 %
Ni	1.94 %	Mo	0.31 %
V	<0.001 %	Cu	0.03 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	W	Producer	DTNSRDC
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	W
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	001.027.09	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	M22000/1E	Filler Name	*
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19000.2

(continued)

Property Measurements						
Test Type .....		Tensile		Position .....		*
Specimen Type .....		Cylindrical		Specimen Thickness .....		0.25 in
Gage Length .....		1.0 in		Loading Rate .....		0.002 in/min
Tensile Strength Offset .....		0.2 %		Uniform Elongation .....		*
Tensile Modulus .....		30.4 ksi*10**3		Standard Method .....		E 8
Standard Year .....		1969				
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	121	113.0	*	21	61

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19000.3

<b>Description</b>			
Material Code	001.027.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRM
Reference	USN 6/9		

<b>Composition</b>	See Page 19000.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19000.1
----------------------------	------------------

<b>Weld</b>	See Page 19000.1
-------------	------------------

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	E813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in <sup>2</sup>	Tear Mod in-lb/in**2
T-L	Room	459	21
T-L	Room	504	22
T-L	Room	515	18
T-L	Room	557	18
T-L	Room	582	20
T-L	Room	655	18
T-L	Room	663	22
T-L	Room	679	24
T-L	Room	689	14
T-L	Room	690	19

\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 19000.4

<b>Description</b>			
Material Code	001.027.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRM
Reference	USN 6/9		
<b>Composition</b>		See Page 19000.1	
<b>Fabrication History</b>		See Page 19000.1	
<b>Weld</b>		See Page 19000.1	
<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	*
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	E 23
Standard Year	*		

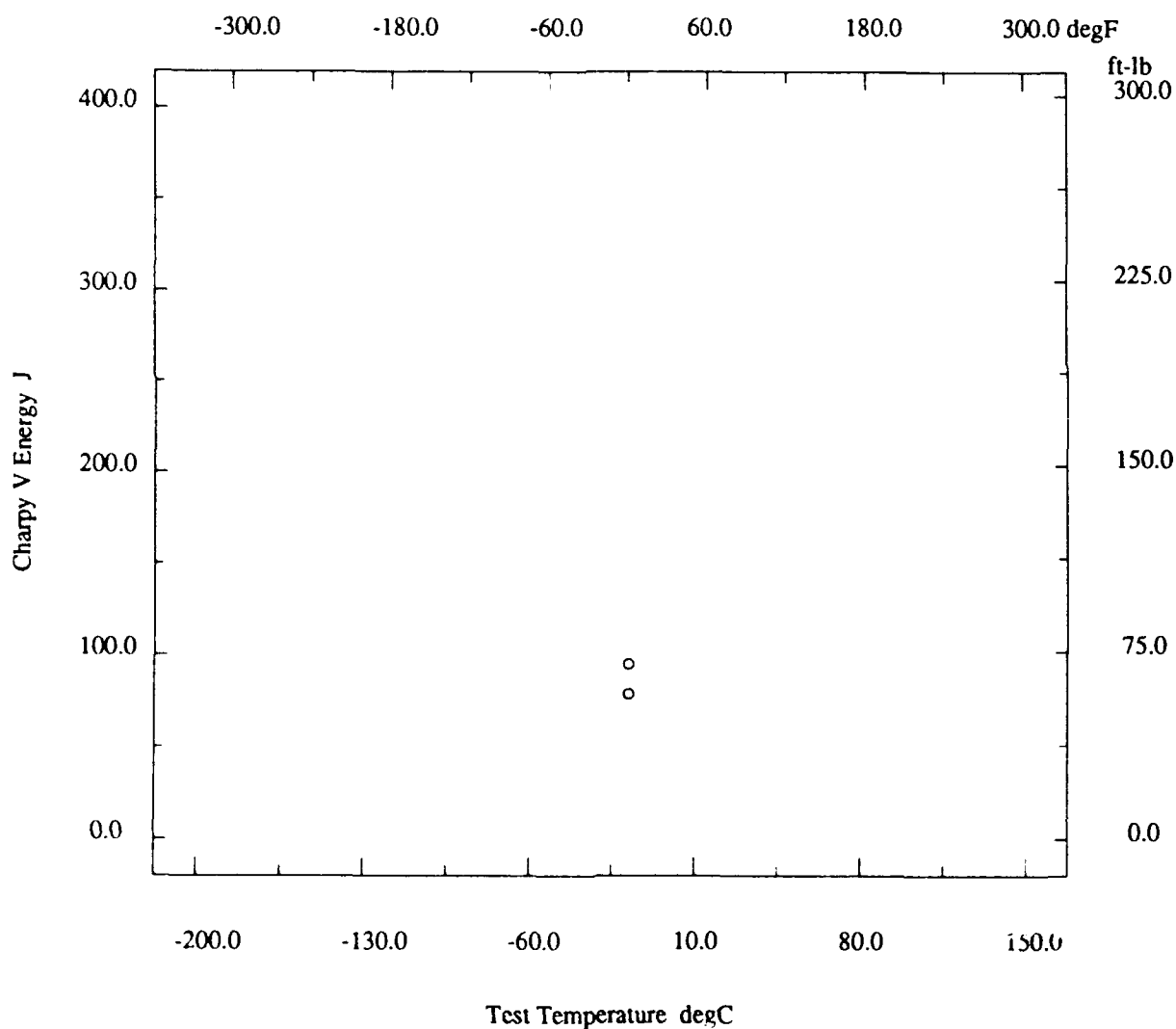
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	0	58
T-L °	0	70

# Marine Structural Toughness Data Bank

Material HY80

Page 19000.5

Description			
Material Code	001.027.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRM
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19000.6

<b>Description</b>		
Material Code	001.027.09	Material Name
UNS	*	Other Designation
Type	Welded Joint	Form
Thickness	2.0 in	Composition Type
Composition Position	*	Lot ID
Reference	USN 6/9	FRM
<b>Composition</b>		See Page 19000.1
<b>Fabrication History</b>		See Page 19000.1
<b>Weld</b>		See Page 19000.1
<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position
Specimen Type	Dynamic Tear	Notch Preparation
Specimen Thickness	0.625 in	Loading Rate
Appearance	*	Standard Method
Standard Year	*	E 604

Orien	Test Temp degF	DT Energy ft-lb
T-L ◯	30	705
T-L ◯	30	815

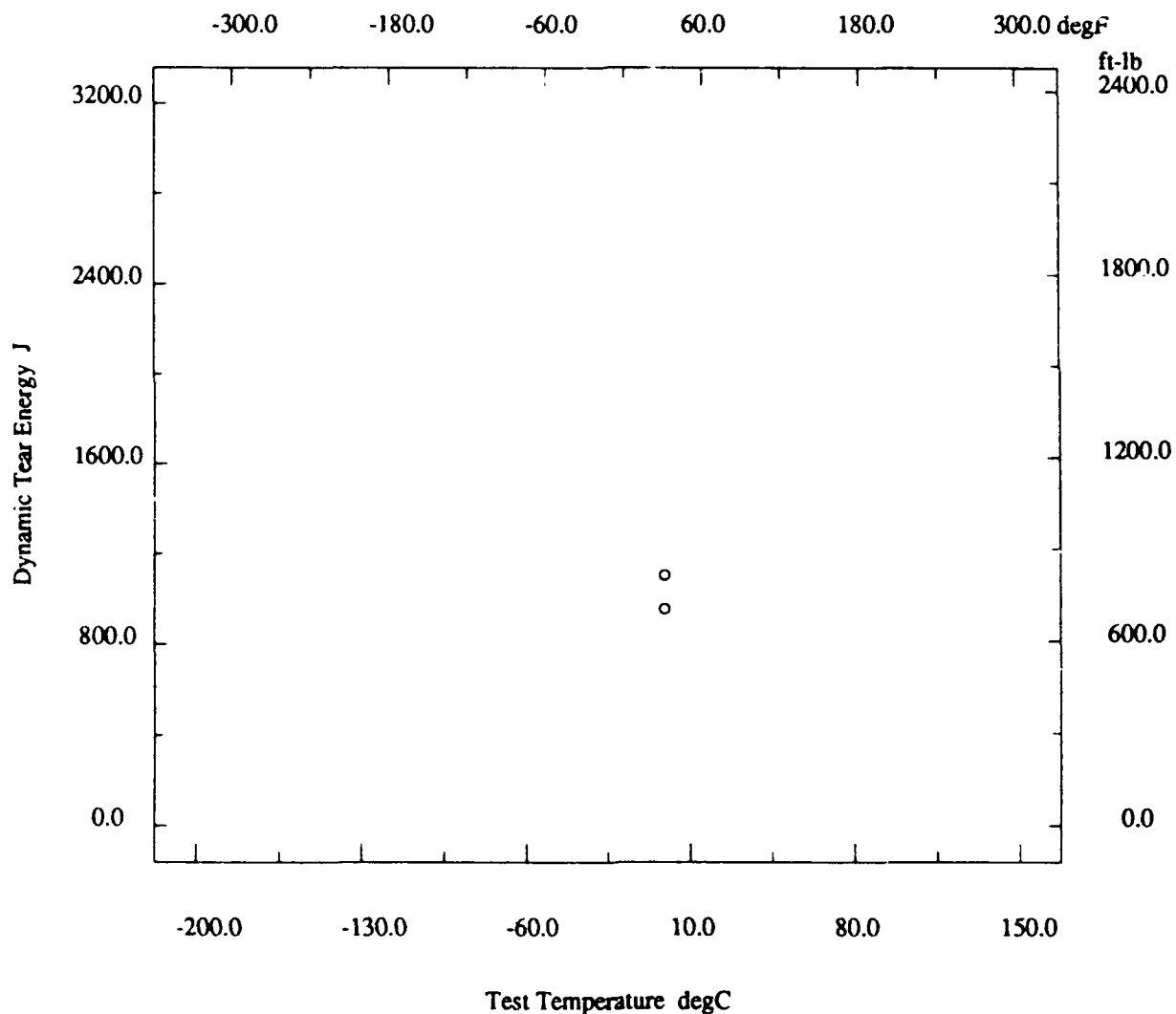
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19000.7

Description			
Material Code	001.027.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRM
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19100.1

<b>Description</b>			
Material Code	001.028.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRN
Reference	USN 6/9		
<b>Composition</b>			
C	0.70 %	Mn	1.53 %
P	0.016 %	S	0.028 %
Si	*	Cr	0.31 %
Ni	2.25 %	Mo	0.41 %
V	0.006 %	Cu	0.01 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	W	Producer	DTNSRDC
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	W
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	001.028.09	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	*	Filler Name	E22000/1E
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19100.2

(continued)

Property Measurements						
Test Type		Tensile		Position		*
Specimen Type		Cylindrical		Specimen Thickness		0.25 in
Gage Length		1.0 in		Loading Rate		0.002 in/min
Tensile Strength Offset		0.2 %		Uniform Elongation		*
Tensile Modulus		29.5 ksi*10**3		Standard Method		E 8
Standard Year		1969				
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	118.8	113.5	*	21	64

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19100.3

<b>Description</b>			
Material Code	001.028.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRN
Reference	USN 6/9		

<b>Composition</b>	See Page 19100.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19100.1
----------------------------	------------------

<b>Weld</b>	See Page 19100.1
-------------	------------------

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
Jlcp	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	E813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	266	30
T-L	Room	362	31
T-L	Room	367	20
T-L	Room	395	24
T-L	Room	401	25
T-L	Room	462	25
T-L	Room	561	17

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19100.4

<b>Description</b>		
Material Code	001.028.09	Material Name HY80
UNS	*	Other Designation *
Type	Welded Joint	Form *
Thickness	2.0 in	Composition Type Actual
Composition Position	*	Lot ID FRN
Reference	USN 6/9	

<b>Composition</b>	See Page 19100.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19100.1
----------------------------	------------------

<b>Weld</b>	See Page 19100.1
-------------	------------------

<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position *
Specimen Type	Full	Lateral Expansion *
Shear Fracture	*	Did Specimen Fracture? Assumed
Did Specimen Split?	*	Standard Method E 23
Standard Year	*	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	0	52
T-L °	0	61

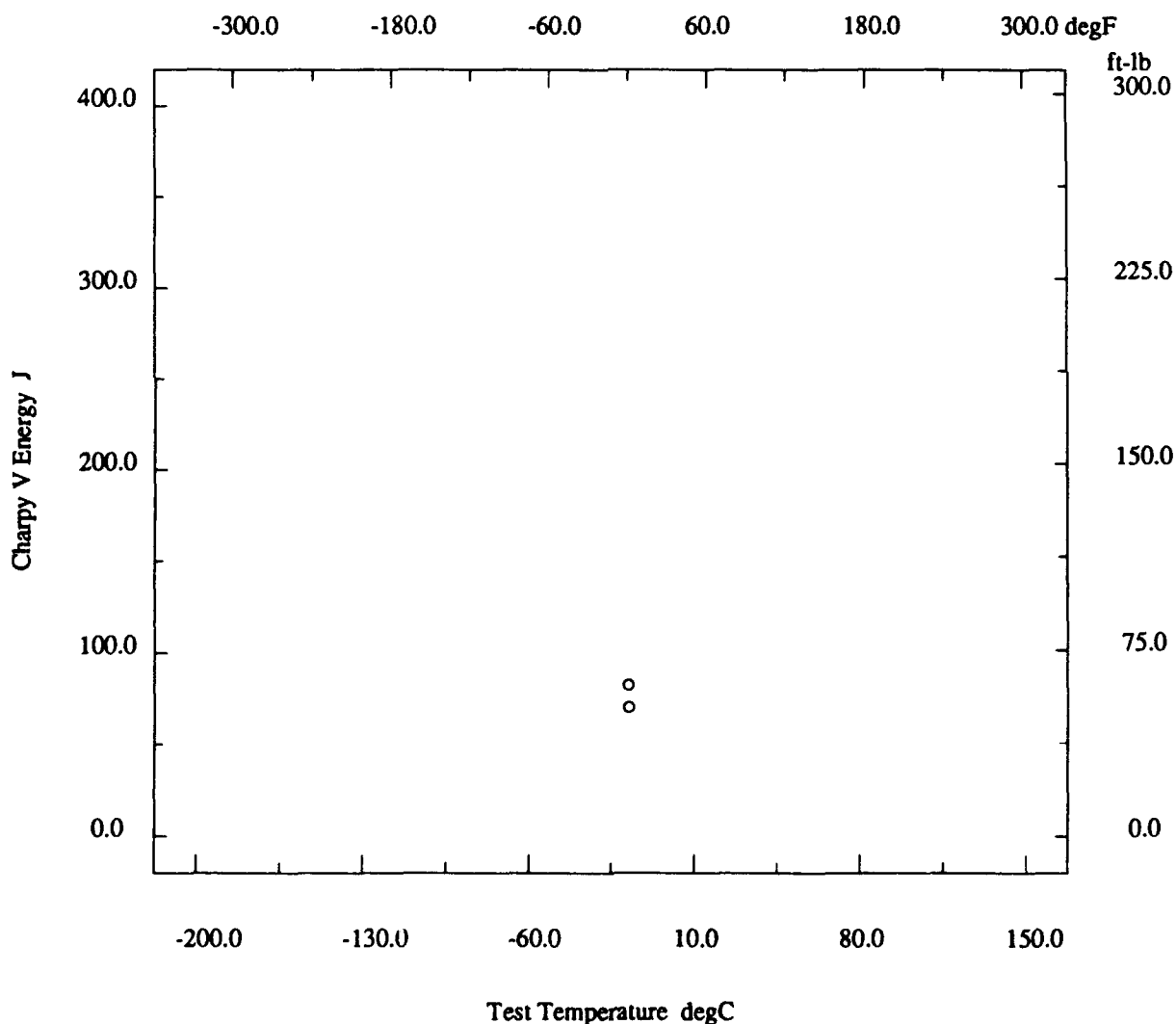


# Marine Structural Toughness Data Bank

Material HY80

Page 19100.5

Description			
Material Code	001.028.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRN
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19100.6

<b>Description</b>		
Material Code	001.028.09	Material Name HY80
UNS	*	Other Designation *
Type	Welded Joint	Form *
Thickness	2.0 in	Composition Type Actual
Composition Position	*	Lot ID FRN
Reference	USN 6/9	
<b>Composition</b>		See Page 19100.1
<b>Fabrication History</b>		See Page 19100.1
<b>Weld</b>		See Page 19100.1
<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position *
Specimen Type	Dynamic Tear	Notch Preparation Pressed
Specimen Thickness	0.625 in	Loading Rate *
Appearance	*	Standard Method E 604
Standard Year	*	

Orien	Test Temp degF	DT Energy ft-lb
T-L o	30	605
T-L o	30	680

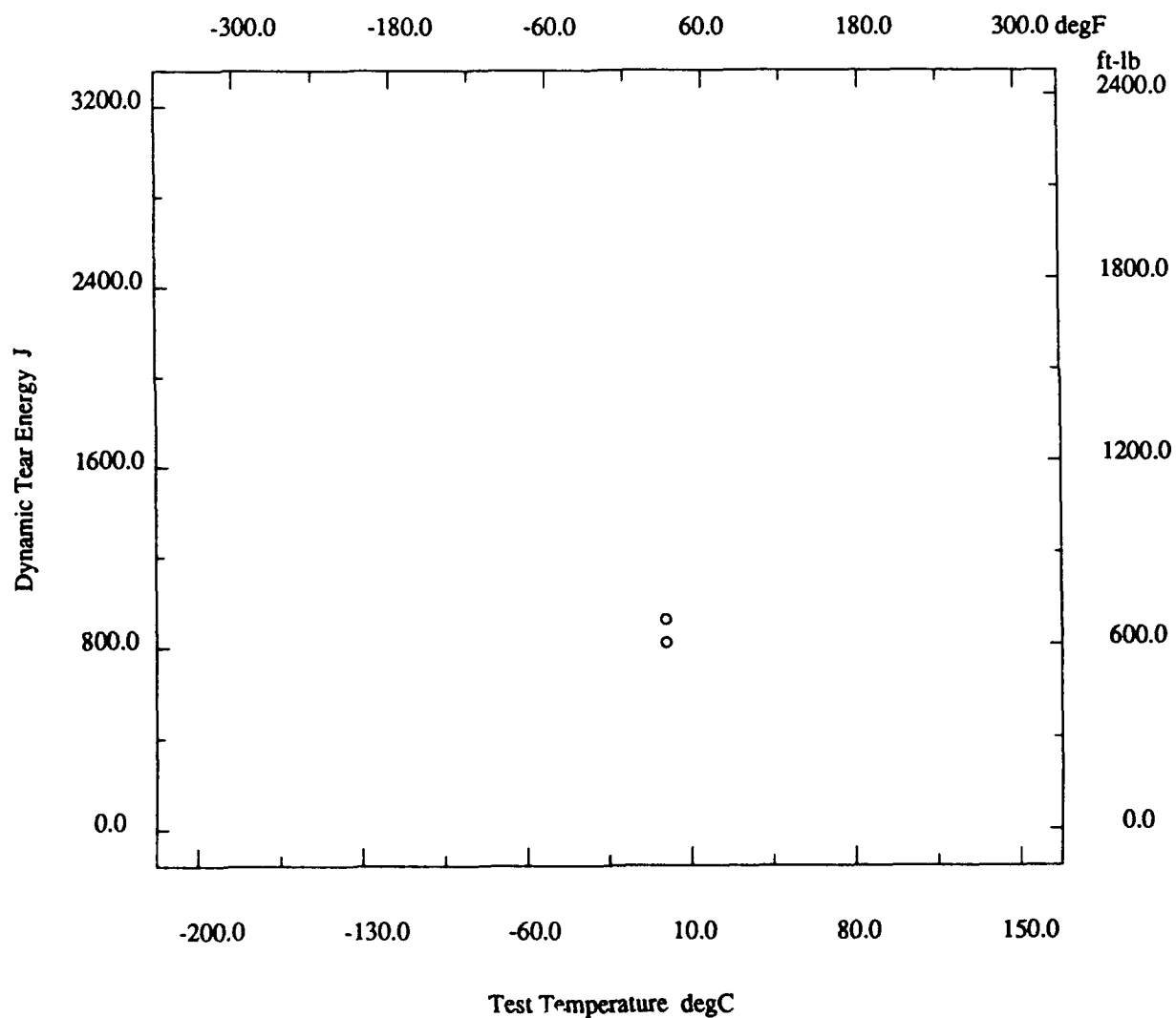
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19100.7

<b>Description</b>			
Material Code	001.028.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRN
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19200.1

<b>Description</b>			
Material Code	001.029.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FVD
Reference	USN 6/9		
<b>Composition</b>			
C	0.06 %	Mn	1.60 %
P	0.018 %	S	0.01 %
Si	*	Cr	0.34 %
Ni	1.50 %	Mo	0.33 %
V	<0.001 %	Cu	0.04 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	W	Producer	DTNSRDC
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	W
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	001.029.09	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	*	Filler Name	E22000/1E
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY80

Page 19200.2

(continued)

Property Measurements						
Test Type		Tensile		Position		*
Specimen Type		Cylindrical		Specimen Thickness	0.25 in	
Gage Length		1.0 in		Loading Rate	0.002 in/min	
Tensile Strength Offset		0.2 %		Uniform Elongation		*
Tensile Modulus		28.5 ksi*10**3		Standard Method	E 8	
Standard Year		1969				
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	133.4	115	*	12	58

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19200.3

<b>Description</b>			
Material Code	001.029.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FVD
Reference	USN 6/9		

<b>Composition</b>	See Page 19200.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19200.1
----------------------------	------------------

<b>Weld</b>	See Page 19200.1
-------------	------------------

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	E813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	375	23
T-L	Room	477	19
T-L	Room	577	28
T-L	Room	590	18
T-L	Room	591	22
T-L	Room	696	15
T-L	Room	796	20

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19200.4

<b>Description</b>	
Material Code .....	001.029.09
Material Name .....	HY80
UNS .....	*
Other Designation .....	*
Type .....	Welded Joint
Form .....	*
Thickness .....	2.0 in
Composition Type .....	Actual
Composition Position .....	*
Lot ID .....	FVD
Reference .....	USN 6/9
<b>Composition</b>	
See Page 19200.1	
<b>Fabrication History</b>	
See Page 19200.1	
<b>Weld</b>	
See Page 19200.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	*
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	E 23
Standard Year .....	*

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-60	37
T-L °	-60	62
T-L °	0	62
T-L °	0	66

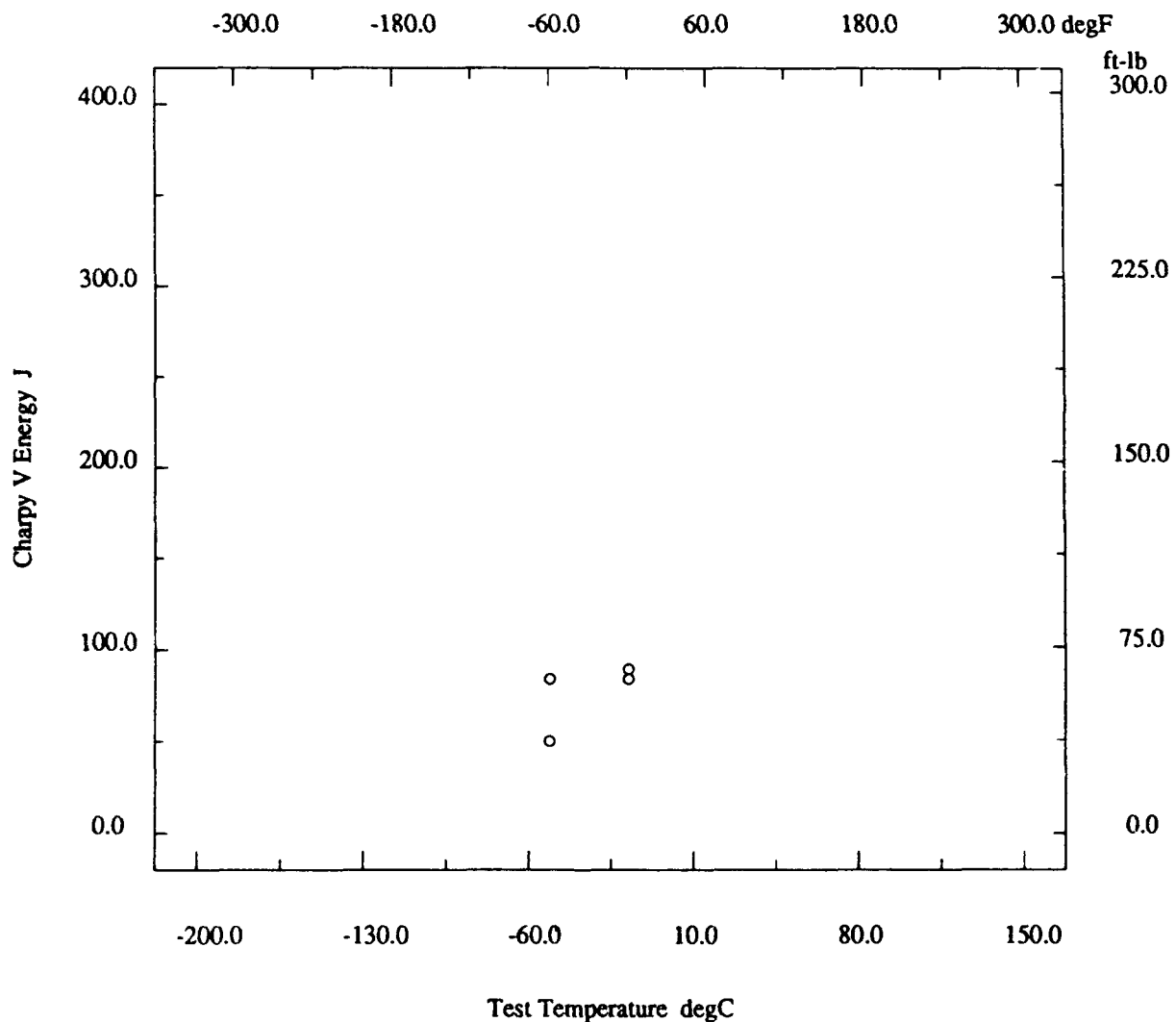
\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19200.5

Description			
Material Code	001.029.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FVD
Reference	USN 6/9		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY80

Page 19200.6

<b>Description</b>			
Material Code	001.029.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FVD
Reference	USN 6/9		
<b>Composition</b>		See Page 19200.1	
<b>Fabrication History</b>		See Page 19200.1	
<b>Weld</b>		See Page 19200.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	*
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Appearance	*	Standard Method	E 604
Standard Year	*		

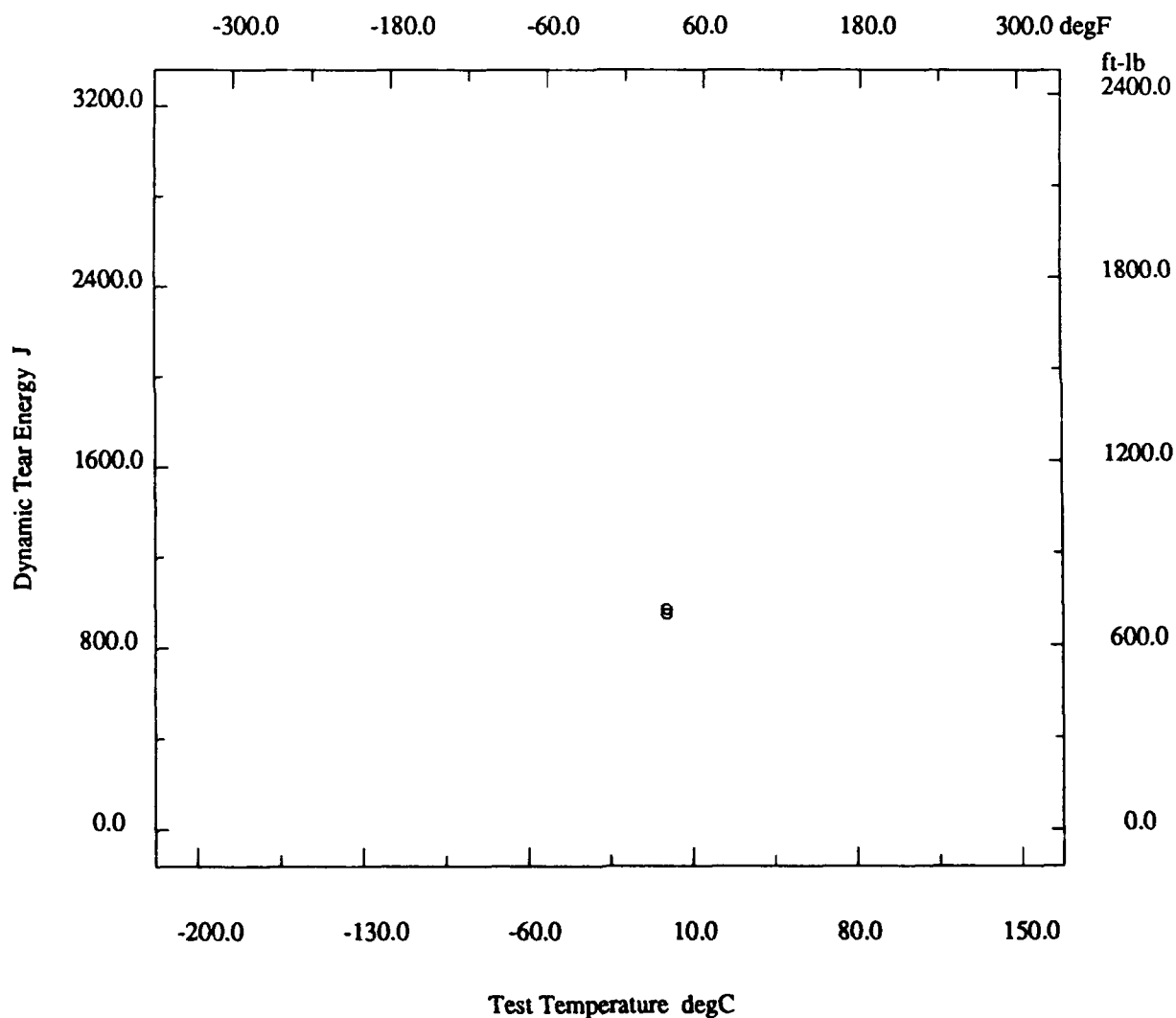
Orien	Test Temp degF	DT Energy ft-lb
T-L °	30	700
T-L °	30	715

# Marine Structural Toughness Data Bank

Material HY80

Page 19200.7

Description			
Material Code	001.029.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FVD
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19300.1

<b>Description</b>			
Material Code	001.030.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXG
Reference	USN 6/9		
<b>Composition</b>			
C	0.06 %	Mn	1.46 %
P	0.018 %	S	0.01 %
Si	*	Cr	0.34 %
Ni	1.88 %	Mo	0.33 %
V	0.006 %	Cu	0.03 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	W	Producer	Minsy
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	W
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	001.030.09	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	*	Filler Name	E22000/1E
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19300.2

(continued)

## Property Measurements

Test Type .....	Tensile	Position .....	*
Specimen Type .....	Cylindrical	Specimen Thickness .....	0.25 in
Gage Length .....	1.0 in	Loading Rate .....	0.002 in/min
Tensile Strength Offset .....	0.2 %	Uniform Elongation .....	*
Tensile Modulus .....	*	Standard Method .....	E 8
Standard Year .....	1969		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	123.5	116.6	*	21	64

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19300.3

<b>Description</b>			
Material Code	001.030.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXG
Reference	USN 6/9		

<b>Composition</b>	See Page 19300.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19300.1
----------------------------	------------------

<b>Weld</b>	See Page 19300.1
-------------	------------------

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	E813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	516	90
T-L	Room	540	95
T-L	Room	575	101
T-L	Room	636	111

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19300.4

<b>Description</b>	
Material Code .....	001.030.09
UNS .....	*
Type .....	Welded Joint
Thickness .....	2.0 in
Composition Position .....	*
Reference .....	USN 6/9
Material Name .....	HY80
Other Designation .....	*
Form .....	*
Composition Type .....	Actual
Lot ID .....	FXG
<b>Composition</b>	
See Page 19300.1	
<b>Fabrication History</b>	
See Page 19300.1	
<b>Weld</b>	
See Page 19300.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	*
Position .....	*
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	E 23

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-60	42
T-L °	-60	52
T-L °	0	58
T-L °	0	59

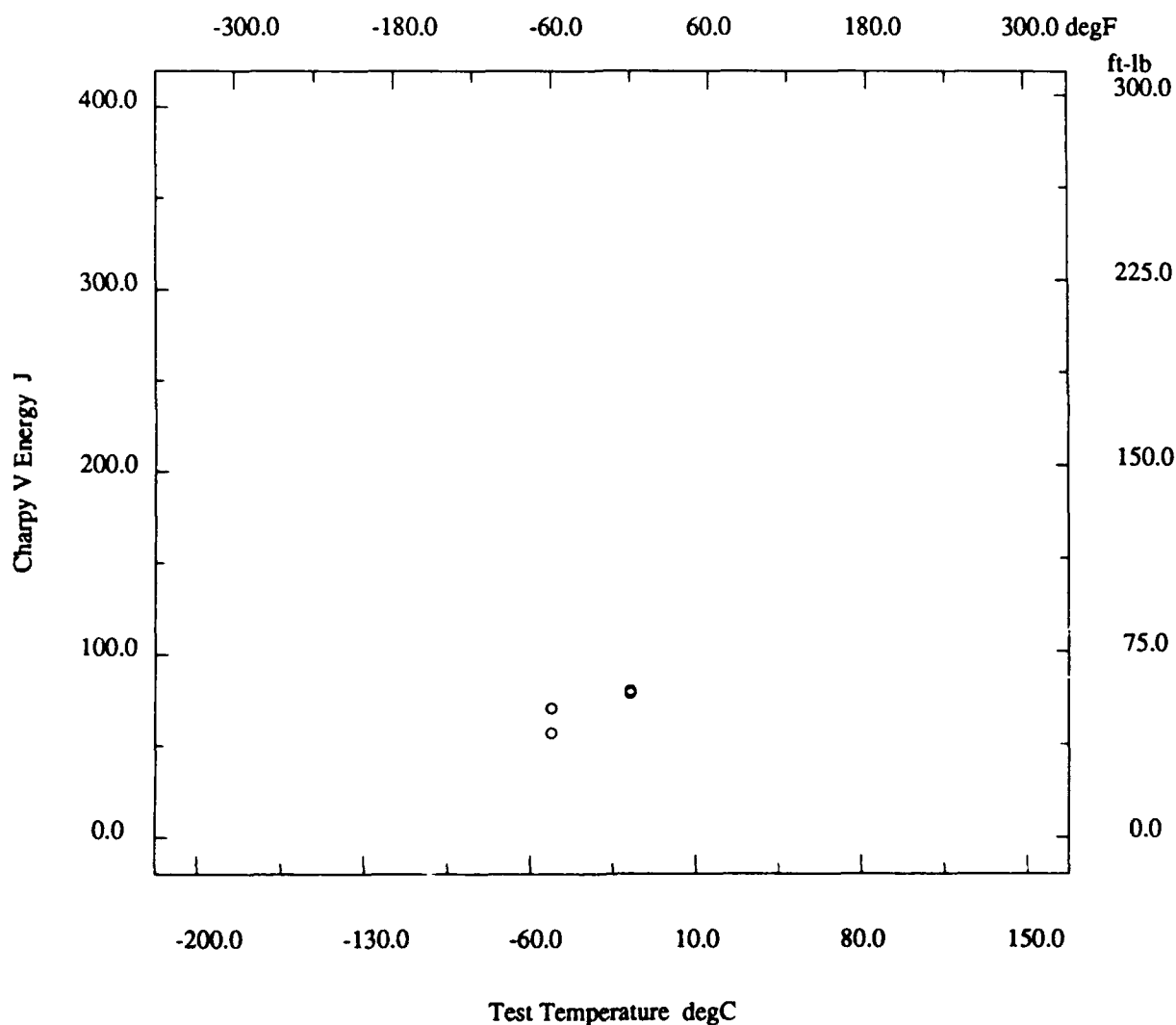
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# Marine Structural Toughness Data Bank

Material HY80

Page 19300.5

Description			
Material Code	001.030.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXG
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19300.6

<b>Description</b>			
Material Code	001.030.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXG
Reference	USN 6/9		
<b>Composition</b>		See Page 19300.1	
<b>Fabrication History</b>		See Page 19300.1	
<b>Weld</b>		See Page 19300.1	
<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	*
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Appearance	*	Standard Method	E 604
Standard Year	*		

Orien	Test Temp degF	DT Energy ft-lb
T-L ◦	30	760
T-L ◦	30	800

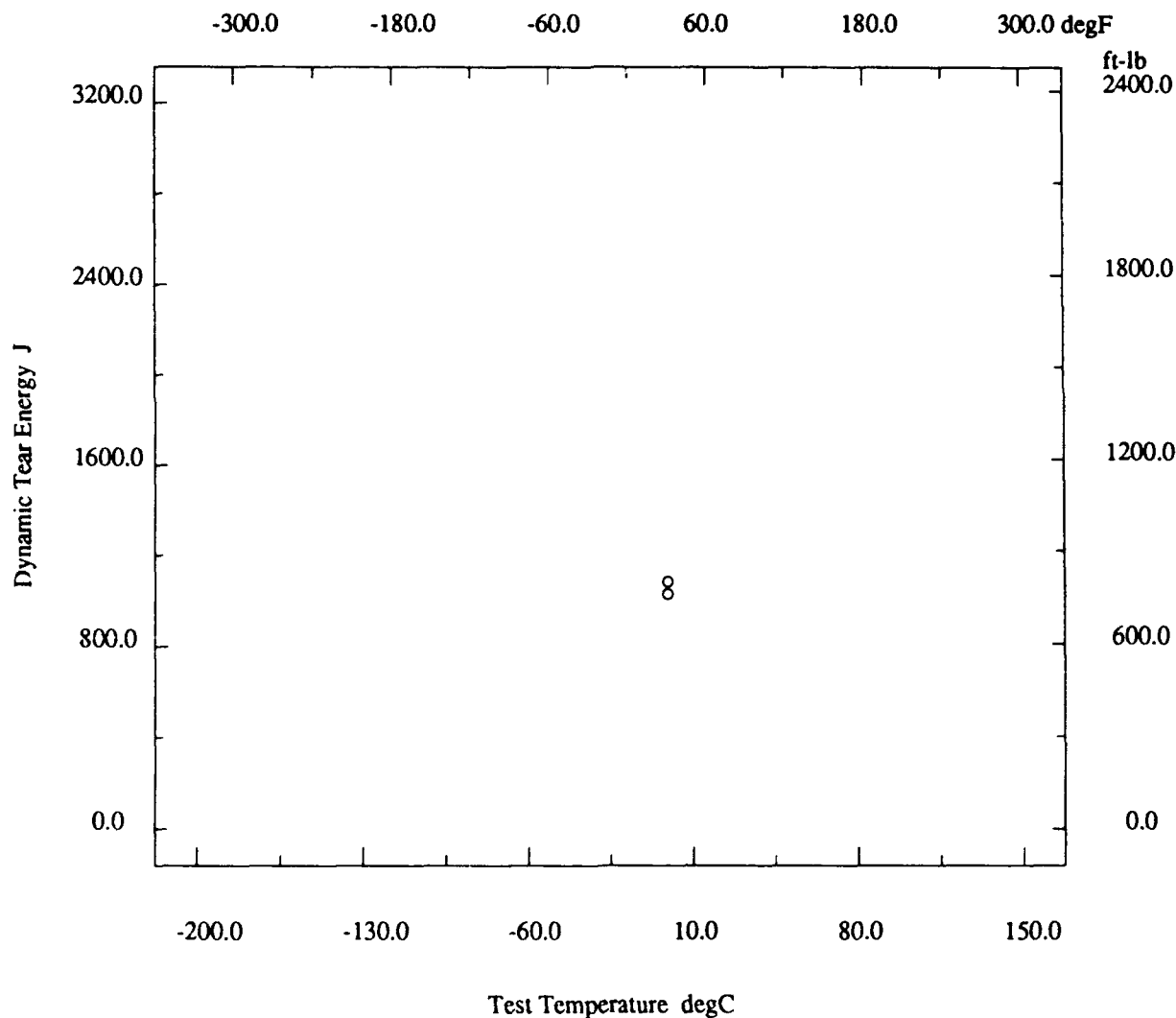


# Marine Structural Toughness Data Bank

Material HY80

Page 19300.7

Description			
Material Code	001.030.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXG
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19400.1

<b>Description</b>			
Material Code	001.031.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXF
Reference	USN 6/9		
<b>Composition</b>			
C	0.07 %	Mn	1.13 %
P	0.015 %	S	0.015 %
Si	*	Cr	0.82 %
Ni	2.29 %	Mo	0.35 %
V	0.005 %	Cu	0.20 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	W	Producer	Minsy
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	W
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	001.031.09	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	*	Filler Name	E22000/1E
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19400.2

(continued)

Property Measurements			
Test Type .....	Tensile	Position .....	*
Specimen Type .....	Cylindrical	Specimen Thickness .....	0.25 in
Gage Length .....	1.0 in	Loading Rate .....	0.002 in/min
Tensile Strength Offset .....	0.2 %	Uniform Elongation .....	*
Tensile Modulus .....	*	Standard Method .....	E 8
Standard Year .....	1969		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	117.7	108.8	*	30	63

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19400.3

<b>Description</b>			
Material Code	001.031.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXF
Reference	USN 6/9		
<b>Composition</b>		See Page 19400.1	
<b>Fabrication History</b>		See Page 19400.1	
<b>Weld</b>		See Page 19400.1	
<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
Jlcp	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	E813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	263	30
T-L	Room	271	24
T-L	Room	280	31
T-L	Room	516	20
T-L	Room	528	22
T-L	Room	642	17

\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19400.4

<b>Description</b>			
Material Code	001.031.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXF
Reference	USN 6/9		

<b>Composition</b>	See Page 19400.1
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<b>Fabrication History</b>	See Page 19400.1
----------------------------	------------------

<b>Weld</b>	See Page 19400.1
-------------	------------------

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Position	*
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	E 23
Standard Year	*		

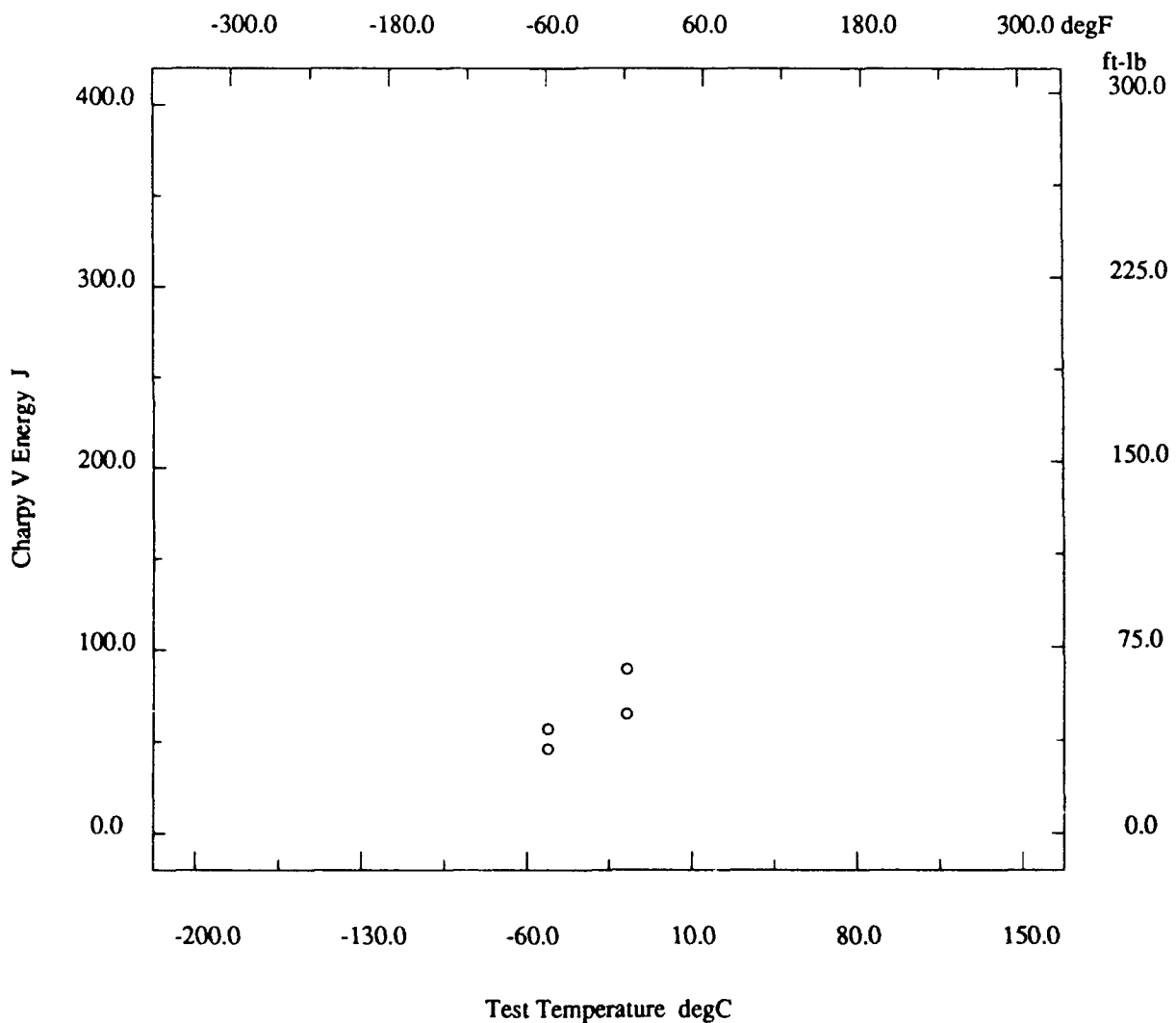
Orien	Test Temp degF	CVN Energy ft-lb
T-L ◯	-60	34
T-L ◯	-60	42
T-L ◯	0	48
T-L ◯	0	66

# Marine Structural Toughness Data Bank

Material HY80

Page 19400.5

Description			
Material Code	001.031.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXF
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY80

Page 19400.6

<b>Description</b>			
Material Code	001.031.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXF
Reference	USN 6/9		

<b>Composition</b>	See Page 19400.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19400.1
----------------------------	------------------

<b>Weld</b>	See Page 19400.1
-------------	------------------

<b>Property Measurements</b>			
Test Type	Dynamic Tear	Position	*
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Appearance	*	Standard Method	E 604
Standard Year	*		

Orien	Test Temp degF	DT Energy ft-lb
T-L °	30	665
T-L °	30	735

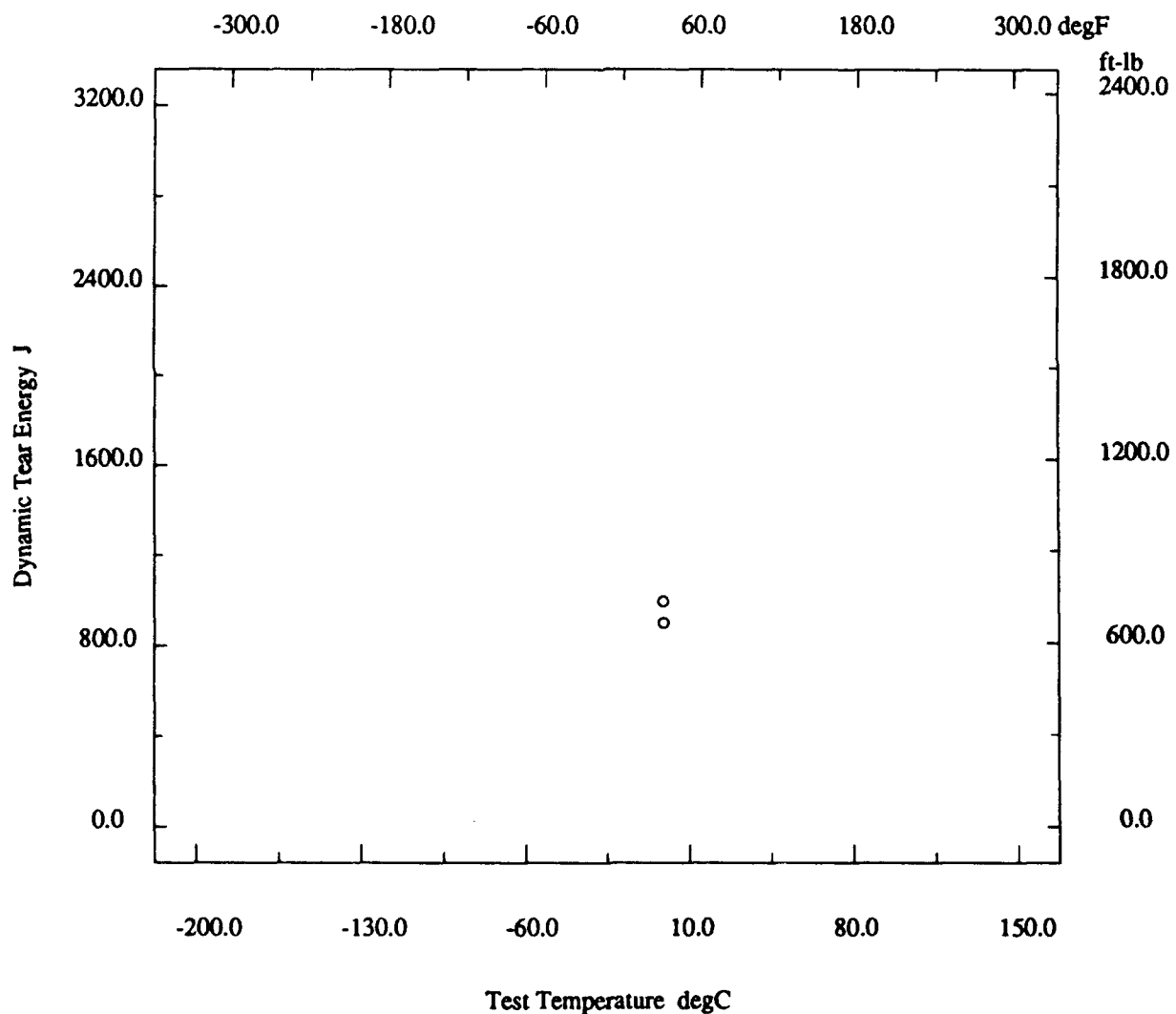
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# Marine Structural Toughness Data Bank

Material HY80

Page 19400.7

Description			
Material Code	001.031.09	Material Name	HY80
UNS	*	Other Designation	*
Type	Welded Joint	Form	*
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FXF
Reference	USN 6/9		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY100

Page 19500.1

<b>Description</b>	
Material Code .....	011.001.01
Material Name .....	HY100
UNS .....	*
Other Designation .....	*
Type .....	Wrought Metal
Form .....	Plate
Thickness .....	2 in
Composition Type .....	Actual
Composition Position .....	*
Lot ID .....	B5761-2R
Reference .....	3530
<b>Composition</b>	
C .....	0.17 %
Mn .....	0.40 %
P .....	0.007 %
S .....	0.019 %
Si .....	0.31 %
Cr .....	1.75 %
Ni .....	3.14 %
Mo .....	0.53 %
V .....	0.01 %
Cu .....	0.21 %
Cb .....	*
Ti .....	*
B .....	*
Al .....	0.05 %
N .....	*
Other Components .....	None %
<b>Fabrication History</b>	
Heat Treatment .....	Q,T
Producer .....	Lukens
Year Produced .....	1982
Addl Info .....	None
Source .....	Lukens
Melting Practice .....	*
Ingot Position .....	*
Killing Process .....	*
Process Temperature .....	1650 degF
Process Time .....	*
Rolling Conditions .....	*
Final Processing .....	Q,T
Final Temperature .....	1050 degF
Final Time .....	*
Cold Work Strain .....	*
Aging Temperature .....	*
Aging Time .....	*
Location .....	*
<b>Property Measurements</b>	
Test Type .....	Tensile
Specimen Type .....	*
Specimen Thickness .....	*
Gage Length .....	*
Loading Rate .....	*
Tensile Strength Offset .....	*
Tensile Yield Point .....	*
Uniform Elongation .....	*
Tensile Modulus .....	*
Standard Method .....	*
Standard Year .....	*

Position	Orient	Test Temp degF	UTS ksi	TYS ksi	Elongation %	RA %
0/4T	L	75	123.3	110.1	22	71.6
0/4T	L	75	123.3	110.2	22	71.6
0/4T	L	75	123.3	110.3	22	71.6
1/2T	L	75	122.6	109.3	21	71.0
1/2T	L	75	122.8	109.4	21	71.1
1/2T	L	75	123.1	109.5	21	71.3
0/4T	T	75	123.6	109.8	19	58.6
0/4T	T	75	123.7	110.3	19	58.7
0/4T	T	75	123.8	110.8	19	58.8
1/2T	T	75	122.8	109.6	20	59.8
1/2T	T	75	122.9	109.3	20	59.8
1/2T	T	75	123.1	109.1	20	59.8

\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19500.2

<b>Description</b>	
Material Code ..... 011.001.01	Material Name ..... HY100
UNS ..... *	Other Designation ..... *
Type ..... Wrought Metal	Form ..... Plate
Thickness ..... 2 in	Composition Type ..... Actual
Composition Position ..... *	Lot ID ..... B5761-2R
Reference ..... 3530	
<b>Composition</b> ..... See Page 19500.1	
<b>Fabrication History</b> ..... See Page 19500.1	
<b>Property Measurements</b>	
Test Type ..... Dynamic Tear	Specimen Type ..... Dynamic Tear
Notch Preparation ..... Pressed	Specimen Thickness ..... 0.625 in
Loading Rate ..... *	Standard Method ..... *
Standard Year ..... *	

Position	Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
0/4T	L-T ◊	-240	100	3
1/2T	L-T ◊	-240	220	8
0/4T	L-T ◊	-220	95	6
1/2T	L-T ◊	-220	95	11
0/4T	L-T ◊	-180	90	9
1/2T	L-T ◊	-180	100	19
0/4T	L-T ◊	-160	180	27
1/2T	L-T ◊	-160	220	45
0/4T	L-T ◊	-140	265	37
1/2T	L-T ◊	-140	450	72
0/4T	L-T ◊	-120	320	47
1/2T	L-T ◊	-120	620	81
0/4T	L-T ◊	-80	840	100
1/2T	L-T ◊	-80	790	100
0/4T	L-T ◊	-40	760	100
1/2T	L-T ◊	-40	810	100
0/4T	L-T ◊	0	815	100
1/2T	L-T ◊	0	820	100
0/4T	L-T ◊	30	875	100
1/2T	L-T ◊	30	925	100
0/4T	T-L ▲	-240	45	3
1/2T	T-L ▲	-240	80	3
0/4T	T-L ▲	-220	75	6
1/2T	T-L ▲	-220	150	14
0/4T	T-L ▲	-180	90	17
1/2T	T-L ▲	-180	150	23
0/4T	T-L ▲	-160	95	16
1/2T	T-L ▲	-160	140	34
0/4T	T-L ▲	-140	125	30
1/2T	T-L ▲	-140	195	51
0/4T	T-L ▲	-120	200	50
1/2T	T-L ▲	-120	270	64
0/4T	T-L ▲	-80	325	100
1/2T	T-L ▲	-80	420	100

(continued)

\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19500.3

(continued)

Position	Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
0/4T	T-L Δ	-40	350	100
1/2T	T-L Δ	-40	475	100
0/4T	T-L Δ	0	600	100
1/2T	T-L Δ	0	470	100
0/4T	T-L Δ	30	410	100
1/2T	T-L Δ	30	500	100

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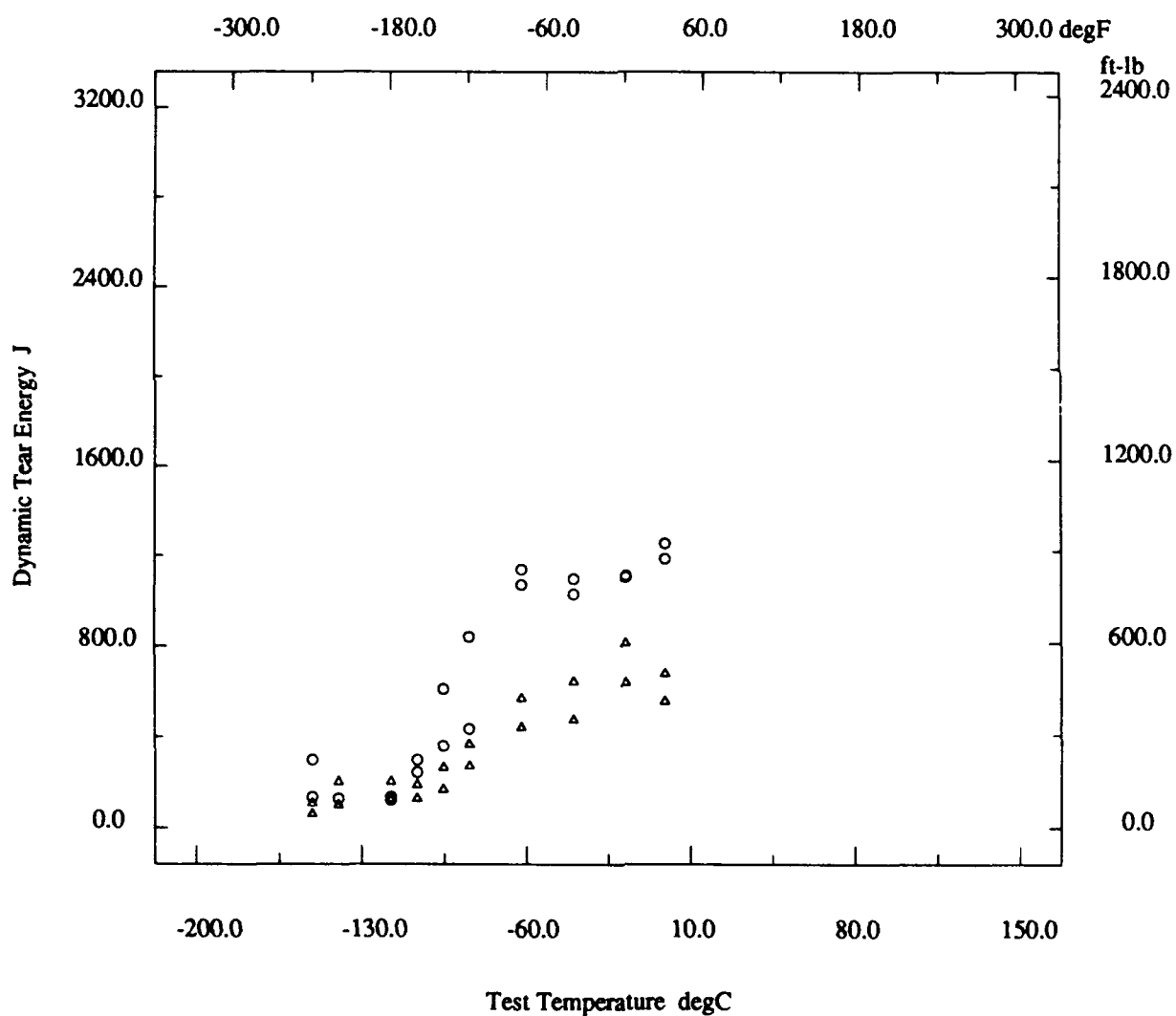
\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19500.4

<b>Description</b>			
Material Code	011.001.01	Material Name	HY100
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2 in	Composition Type	Actual
Composition Position	*	Lot ID	B5761-2R
Reference	3530		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19500.5

<b>Description</b>			
Material Code	011.001.01	Material Name	HY100
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2 in	Composition Type	Actual
Composition Position	*	Lot ID	B5761-2R
Reference	3530		

**Composition** See Page 19500.1

**Fabrication History** See Page 19500.1

<b>Property Measurements</b>			
Test Type	Charpy V Impact	Specimen Type	Full
Did Specimen Fracture?	*	Standard Method	*
Standard Year	*		

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
0/4T	L-T °	-320	8	2	6	No
1/2T	L-T °	-320	8	2	8	No
0/4T	L-T °	-255	23	8	12	No
1/2T	L-T °	-255	33	15	21	No
0/4T	L-T °	-240	21	10	14	No
1/2T	L-T °	-240	22	9	21	No
1/2T	L-T °	-230	36	20	32	Yes
0/4T	L-T °	-220	29	12	19	No
1/2T	L-T °	-220	50	29	46	Yes
0/4T	L-T °	-200	35	19	30	No
1/2T	L-T °	-200	54	32	48	Yes
0/4T	L-T °	-180	42	24	38	No
1/2T	L-T °	-180	67	41	75	Yes
0/4T	L-T °	-170	46	29	50	No
0/4T	L-T °	-160	53	35	55	No
1/2T	L-T °	-160	71	46	77	Yes
0/4T	L-T °	-140	62	40	65	Yes
1/2T	L-T °	-140	85	57	94	Yes
0/4T	L-T °	-120	80	53	99	Yes
1/2T	L-T °	-120	88	58	99	Yes
0/4T	L-T °	-90	80	52	100	Yes
1/2T	L-T °	-90	99	63	100	Yes
0/4T	L-T °	-60	86	58	100	Yes
1/2T	L-T °	-60	100	66	100	Yes
0/4T	L-T °	0	85	56	100	Yes
1/2T	L-T °	0	101	63	100	Yes
0/4T	L-T °	30	87	65	100	Yes
1/2T	L-T °	30	106	66	100	Yes
0/4T	L-T °	74	85	64	100	Yes
1/2T	L-T °	74	103	73	100	Yes
0/4T	T-L △	-320	10	2	8	No
1/2T	T-L △	-320	8	2	8	No
0/4T	T-L △	-255	19	6	11	No
1/2T	T-L △	-255	18	6	18	No
0/4T	T-L △	-240	9	6	11	No

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY100

Page 19500.6

(continued)

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
1/2T	T-L ^	-240	20	9	21	No
0/4T	T-L ^	-230	18	5	14	No
0/4T	T-L ^	-220	20	8	19	No
1/2T	T-L ^	-220	24	12	26	No
0/4T	T-L ^	-200	18	8	22	No
1/2T	T-L ^	-200	30	18	40	No
0/4T	T-L ^	-180	23	14	33	No
1/2T	T-L ^	-180	31	21	49	No
1/2T	T-L ^	-170	42	27	56	No
0/4T	T-L ^	-160	24	16	40	No
1/2T	T-L ^	-160	45	30	68	No
0/4T	T-L ^	-140	37	27	72	No
1/2T	T-L ^	-140	47	32	78	No
0/4T	T-L ^	-120	37	28	72	No
1/2T	T-L ^	-120	52	39	92	No
0/4T	T-L ^	-90	46	34	98	No
1/2T	T-L ^	-90	58	40	100	No
0/4T	T-L ^	-60	46	35	100	No
1/2T	T-L ^	-60	61	45	100	No
0/4T	T-L ^	0	48	36	100	No
1/2T	T-L ^	0	60	45	100	No
0/4T	T-L ^	30	50	38	100	No
1/2T	T-L ^	30	62	45	100	No
0/4T	T-L ^	74	50	42	100	No
1/2T	T-L ^	74	66	52	100	No

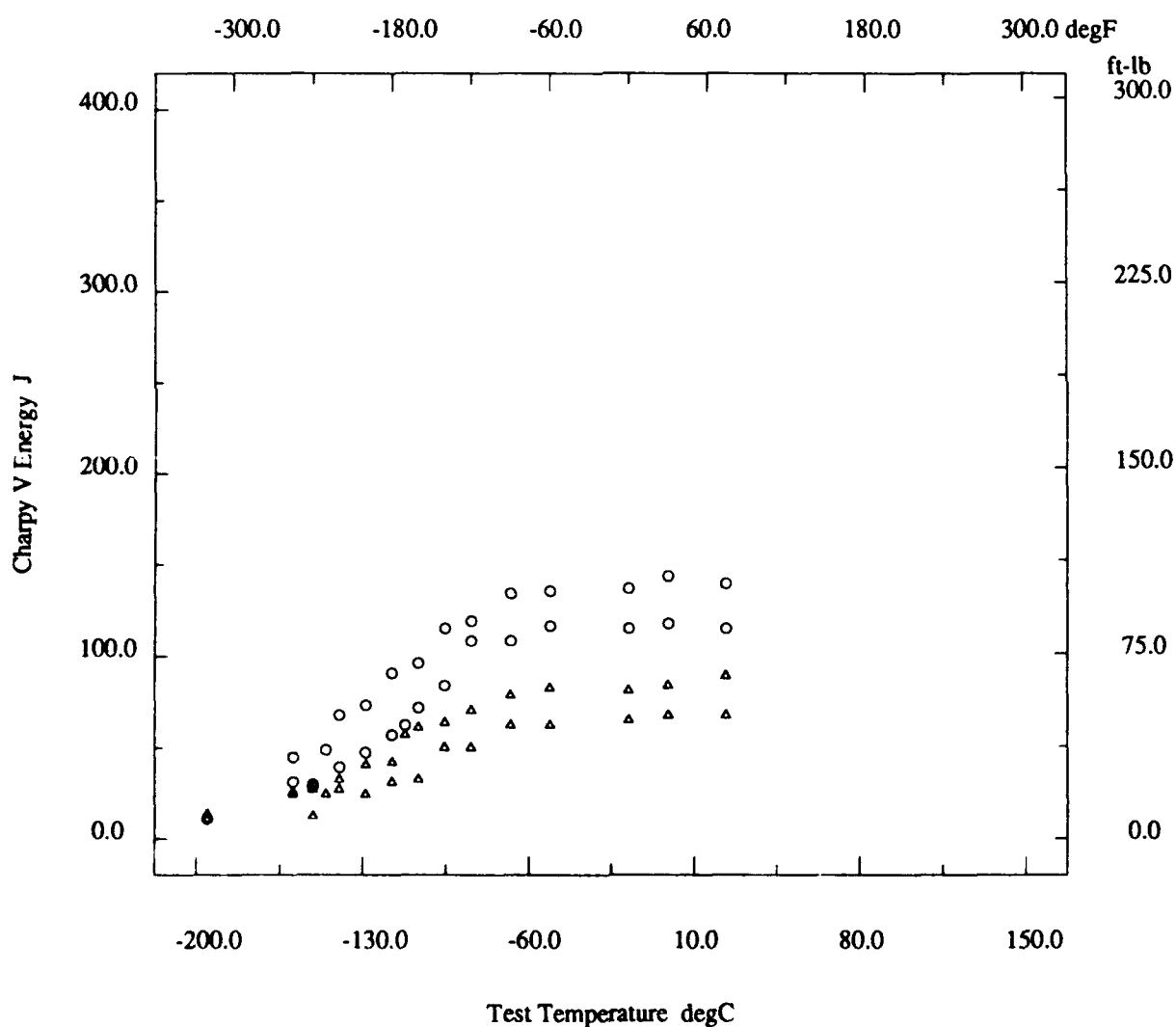
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# Marine Structural Toughness Data Bank

Material HY100

Page 19500.7

Description			
Material Code	011.001.01	Material Name	HY100
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2 in	Composition Type	Actual
Composition Position	*	Lot ID	B5761-2R
Reference	3530		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.1

<b>Description</b>						
Material Code .....	011.003.01					
Material Name .....	HY100					
UNS .....	*					
Other Designation .....	*					
Type .....	Wrought Metal					
Form .....	Plate					
Thickness .....	2.0 in					
Composition Type .....	Actual					
Composition Position .....	*					
Lot ID .....	L467OV559					
Reference .....	USN 6/9					
<b>Composition</b>						
C .....	0.16 %					
Mn .....	0.70 %					
P .....	0.011 %					
S .....	0.014 %					
Si .....	*					
Cr .....	2.93 %					
Ni .....	7.02 %					
Mo .....	0.79 %					
V .....	<0.001 %					
Cu .....	0.23 %					
Cb .....	*					
Ti .....	<0.01 %					
B .....	*					
Al .....	*					
N .....	*					
Other Components .....	None %					
<b>Fabrication History</b>						
Heat Treatment .....	Q,T					
Producer .....	*					
Year Produced .....	*					
Addl Info .....	None					
Source .....	USN					
Melting Practice .....	*					
Ingot Position .....	*					
Killing Process .....	*					
Process Temperature .....	*					
Process Time .....	*					
Rolling Conditions .....	*					
Final Processing .....	Q,T					
Final Temperature .....	*					
Final Time .....	*					
Cold Work Strain .....	*					
Aging Temperature .....	*					
Aging Time .....	*					
Location .....	*					
<b>Property Measurements</b>						
Test Type .....	Tensile					
Position .....	*					
Specimen Type .....	Cylindrical					
Specimen Thickness .....	0.505 in					
Gage Length .....	2.0 in					
Loading Rate .....	0.002 in/min					
Tensile Strength Offset .....	0.2 %					
Uniform Elongation .....	*					
Tensile Modulus .....	29.0 ksi*10**3					
Standard Method .....	E 8					
Standard Year .....	1969					
<b>Orient</b>	<b>Test Temp</b>	<b>UTS</b>	<b>TYS</b>	<b>TYP</b>	<b>Elongation</b>	<b>RA</b>
	<b>degF</b>	<b>ksi</b>	<b>ksi</b>	<b>ksi</b>	<b>%</b>	<b>%</b>
T	Room	113.4	99.0	*	25	72

\* - not reported



# Marine Structural Toughness Data Bank

Material HY100

Page 19600.2

<b>Description</b>			
Material Code	011.003.01	Material Name	HY100
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	L467OV559
Reference	USN 6/9		

<b>Composition</b>	See Page 19600.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19600.1
----------------------------	------------------

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
Jlcp	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	773	67
T-L	Room	830	65
T-L	Room	912	64
T-L	Room	949	49

\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.3

<b>Description</b>	
Material Code .....	011.003.01
UNS .....	*
Type .....	Wrought Metal
Thickness .....	2.0 in
Composition Position .....	*
Reference .....	USN 6/9
Material Name .....	HY100
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	L467OV559
<b>Composition</b>	
See Page 19600.1	
<b>Fabrication History</b>	
See Page 19600.1	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	1972
Position .....	*
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	E 23

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-120	116
T-L °	-120	34

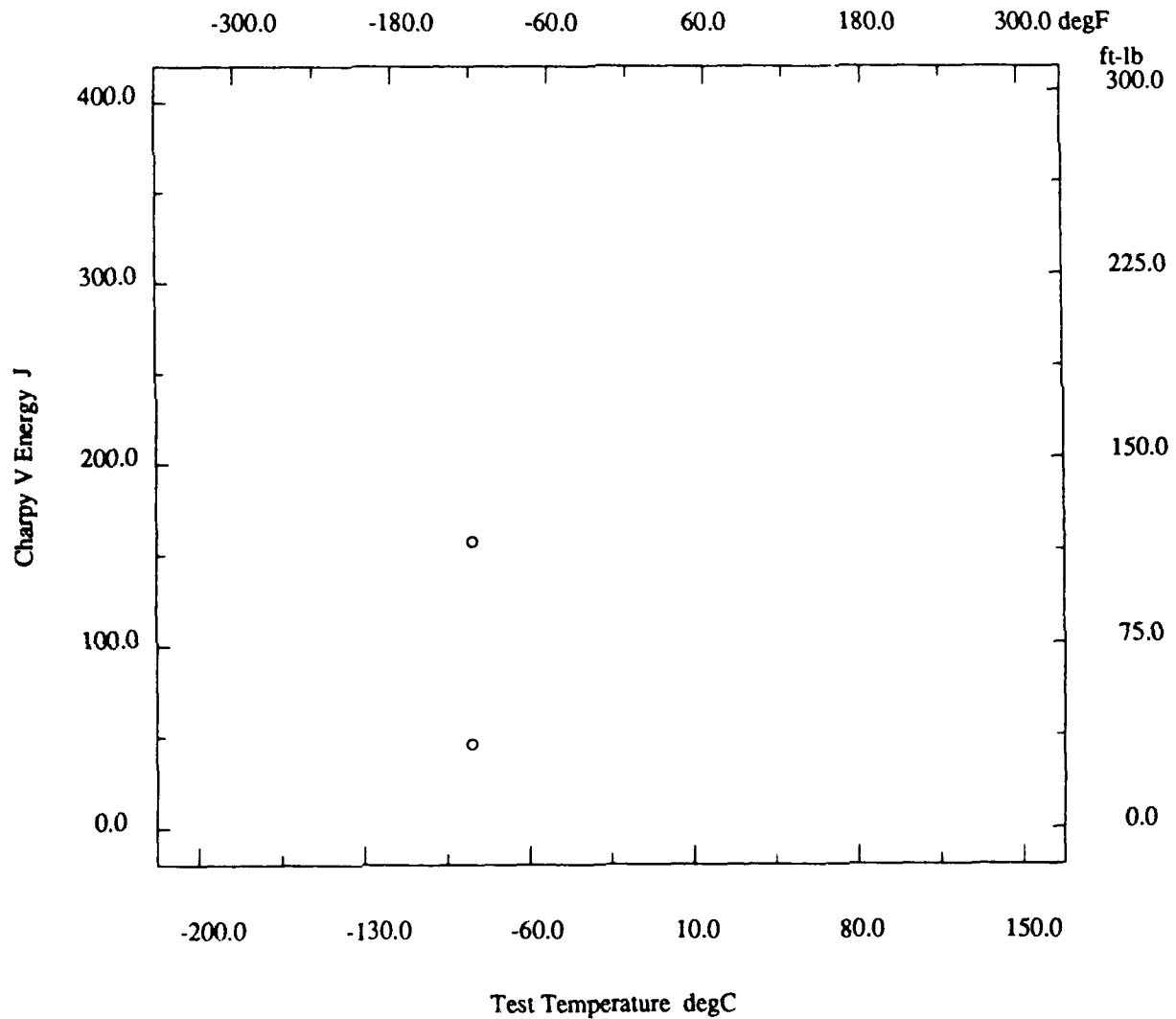
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# Marine Structural Toughness Data Bank

Material HY100

Page 19600.4

Description			
Material Code	011.003.01	Material Name	HY100
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	L4670V559
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.5

<b>Description</b>		
Material Code	011.003.01	Material Name HY100
UNS	*	Other Designation *
Type	Wrought Metal	Form Plate
Thickness	2.0 in	Composition Type Actual
Composition Position	*	Lot ID L467OV559
Reference	USN 6/9	

<b>Composition</b>	See Page 19600.1
--------------------	------------------

<b>Fabrication History</b>	See Page 19600.1
----------------------------	------------------

<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position *
Specimen Type	Dynamic Tear	Notch Preparation Pressed
Specimen Thickness	0.625 in	Loading Rate *
Appearance	*	Standard Method E 604
Standard Year	1980	

Orien	Test Temp degF	DT Energy ft-lb
T-L ◊	0	1085
T-L ◊	0	1220

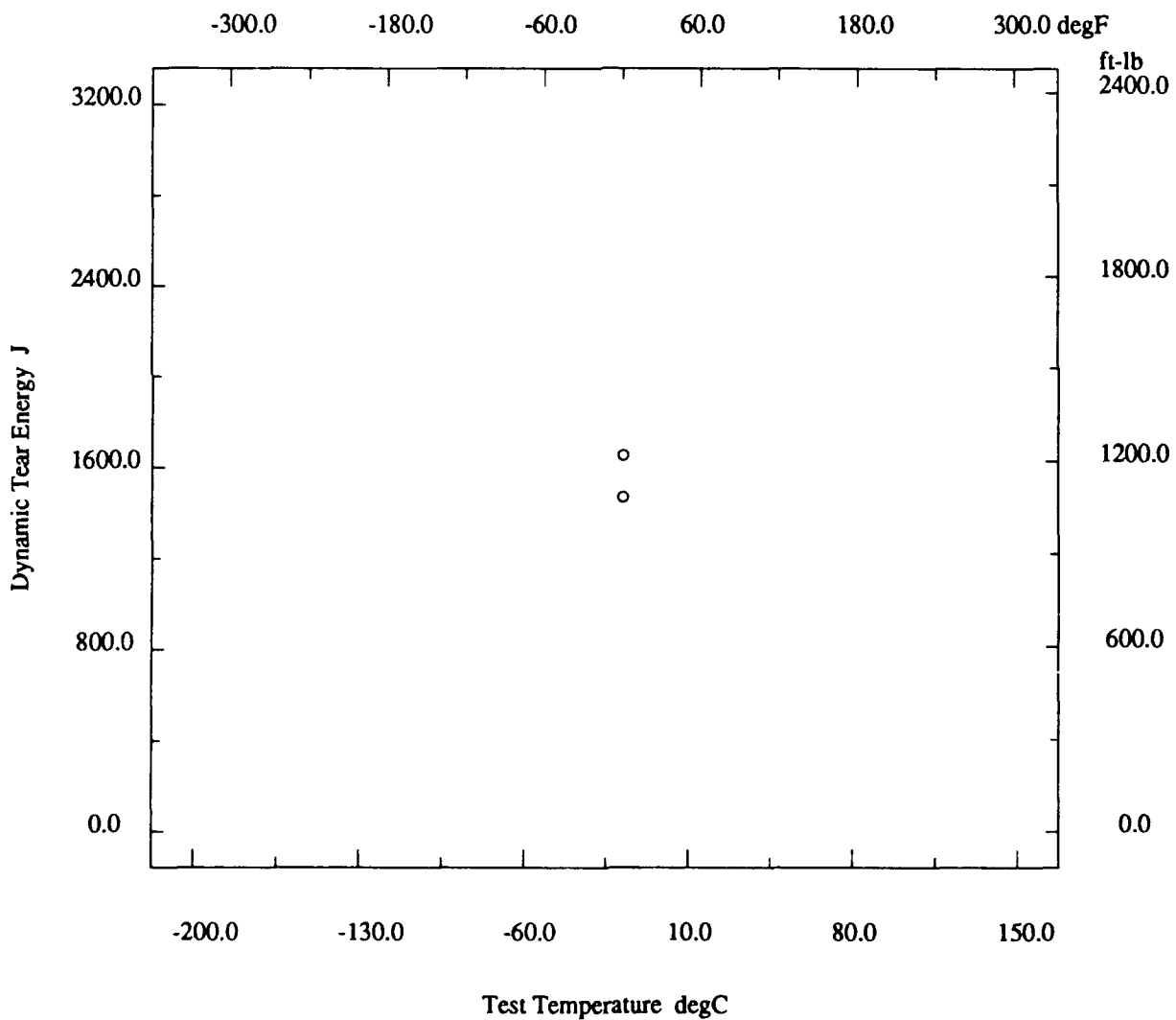
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# Marine Structural Toughness Data Bank

Material HY100

Page 19600.6

Description			
Material Code	011.003.01	Material Name	HY100
UNS	*	Other Designation	*
Type	Wrought Metal	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	L467OV559
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.7

<b>Description</b>			
Material Code	011.003.09A	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRO
Reference	USN 6/9		
<b>Composition</b>			
C	0.07 %	Mn	1.13 %
P	0.013 %	S	0.014 %
Si	*	Cr	0.15 %
Ni	3.49 %	Mo	0.45 %
V	<0.001 %	Cu	0.03 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %
<b>Fabrication History</b>			
Heat Treatment	Q,T,W	Producer	*
Year Produced	*	Addl Info	None
Source	USN	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	Q,T,W
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*
<b>Weld</b>			
Weld Code	011.003.09A	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	M22000/10	Filler Name	*
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

\* - not reported

(continued)

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.8

(continued)

Property Measurements						
Test Type	Tensile		Position	*		
Specimen Type	Cylindrical		Specimen Thickness	0.250 in		
Gage Length	1.0 in		Loading Rate	0.002 in/min		
Tensile Strength Offset	0.2 %		Uniform Elongation	*		
Tensile Modulus	29.9 ksi*10**3		Standard Method	E 8		
Standard Year	1969					
Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	126.5	117.3	*	20	64

\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.9

<b>Description</b>			
Material Code	011.003.09A	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRO
Reference	USN 6/9		

<b>Composition</b>	See Page 19600.7
--------------------	------------------

<b>Fabrication History</b>	See Page 19600.7
----------------------------	------------------

<b>Weld</b>	See Page 19600.7
-------------	------------------

<b>Property Measurements</b>			
Test Type	Fracture Toughness	Position	*
Specimen Type	Compact Tension	Specimen Thickness	1.0 in
Crack Length	*	Loading Type	I
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	KJc	*
JIcpr	Modified Standard	Initial COD	*
Critical COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Standard Method	813	Standard Year	*

Orien	Test Temp degF	JIc in-lb/in <sup>2</sup>	Tear Mod in-lb/in**2
T-L	Room	210	25
T-L	Room	246	14
T-L	Room	302	21
T-L	Room	313	24
T-L	Room	401	8
T-L	Room	424	13
T-L	Room	438	21
T-L	Room	445	19
T-L	Room	526	13

\* - not reported



# Marine Structural Toughness Data Bank

Material HY100

Page 19600.10

<b>Description</b>	
Material Code .....	011.003.09A
Material Name .....	HY100
UNS .....	*
Other Designation .....	*
Type .....	Welded Joint
Form .....	Plate
Thickness .....	2.0 in
Composition Type .....	Actual
Composition Position .....	*
Lot ID .....	FRO
Reference .....	USN 6/9
<b>Composition</b> See Page 19600.7	
<b>Fabrication History</b> See Page 19600.7	
<b>Weld</b> See Page 19600.7	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Position .....	*
Specimen Type .....	Full
Lateral Expansion .....	*
Shear Fracture .....	*
Did Specimen Fracture? .....	Assumed
Did Specimen Split? .....	*
Standard Method .....	E 23
Standard Year .....	1972

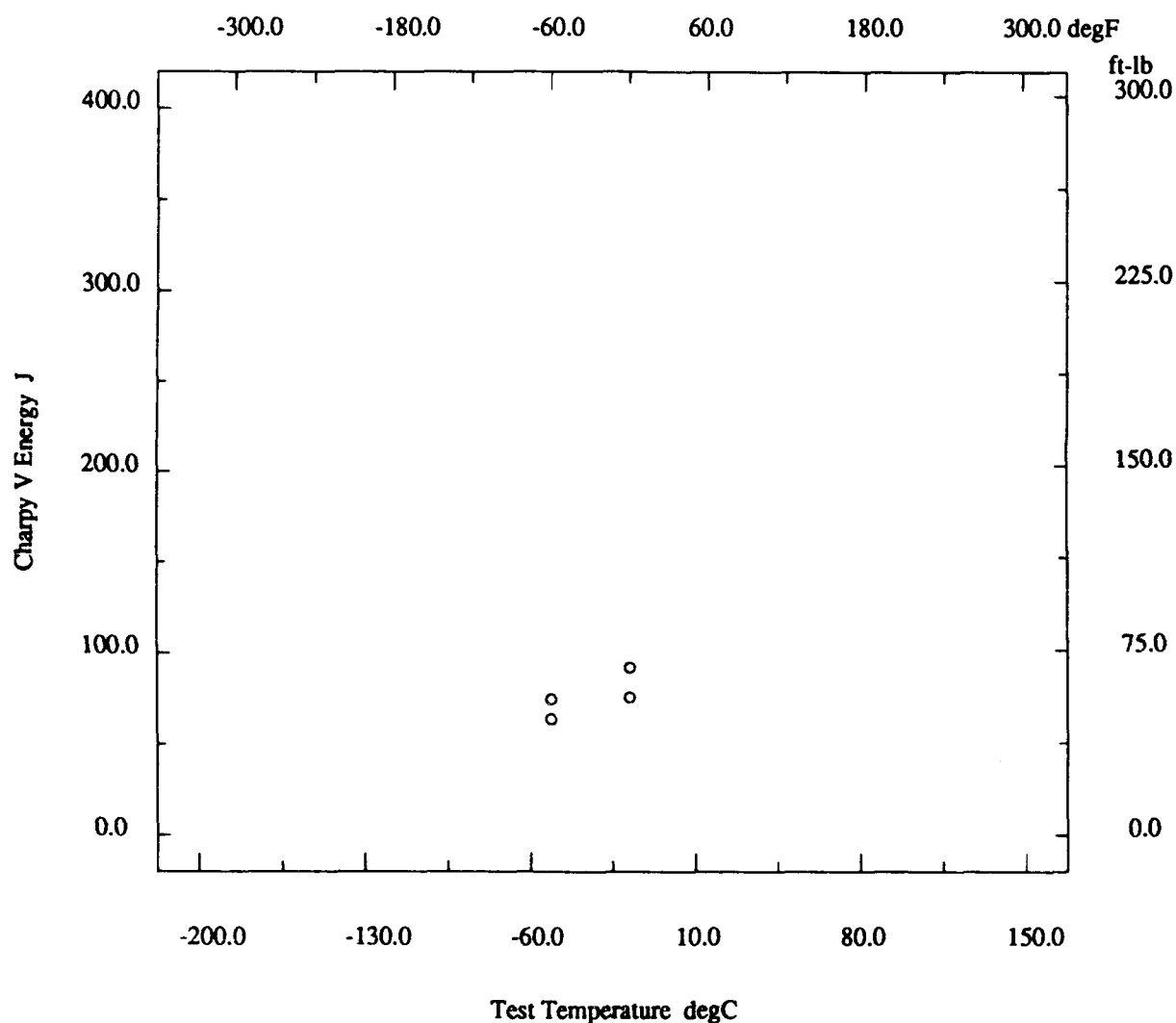
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-60	47
T-L °	-60	55
T-L °	0	56
T-L °	0	68

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.11

Description			
Material Code	011.003.09A	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRO
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.12

<b>Description</b>		
Material Code	011.003.09A	Material Name
UNS	*	Other Designation
Type	Welded Joint	Form
Thickness	2.0 in	Composition Type
Composition Position	*	Lot ID
Reference	USN 6/9	
<b>Composition</b>		See Page 19600.7
<b>Fabrication History</b>		See Page 19600.7
<b>Weld</b>		See Page 19600.7
<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position
Specimen Type	Dynamic Tear	Notch Preparation
Specimen Thickness	0.625 in	Loading Rate
Appearance	*	Standard Method
Standard Year	1980	

Orien	Test Temp degF	DT Energy ft-lb
T-L °	0	520
T-L °	0	580

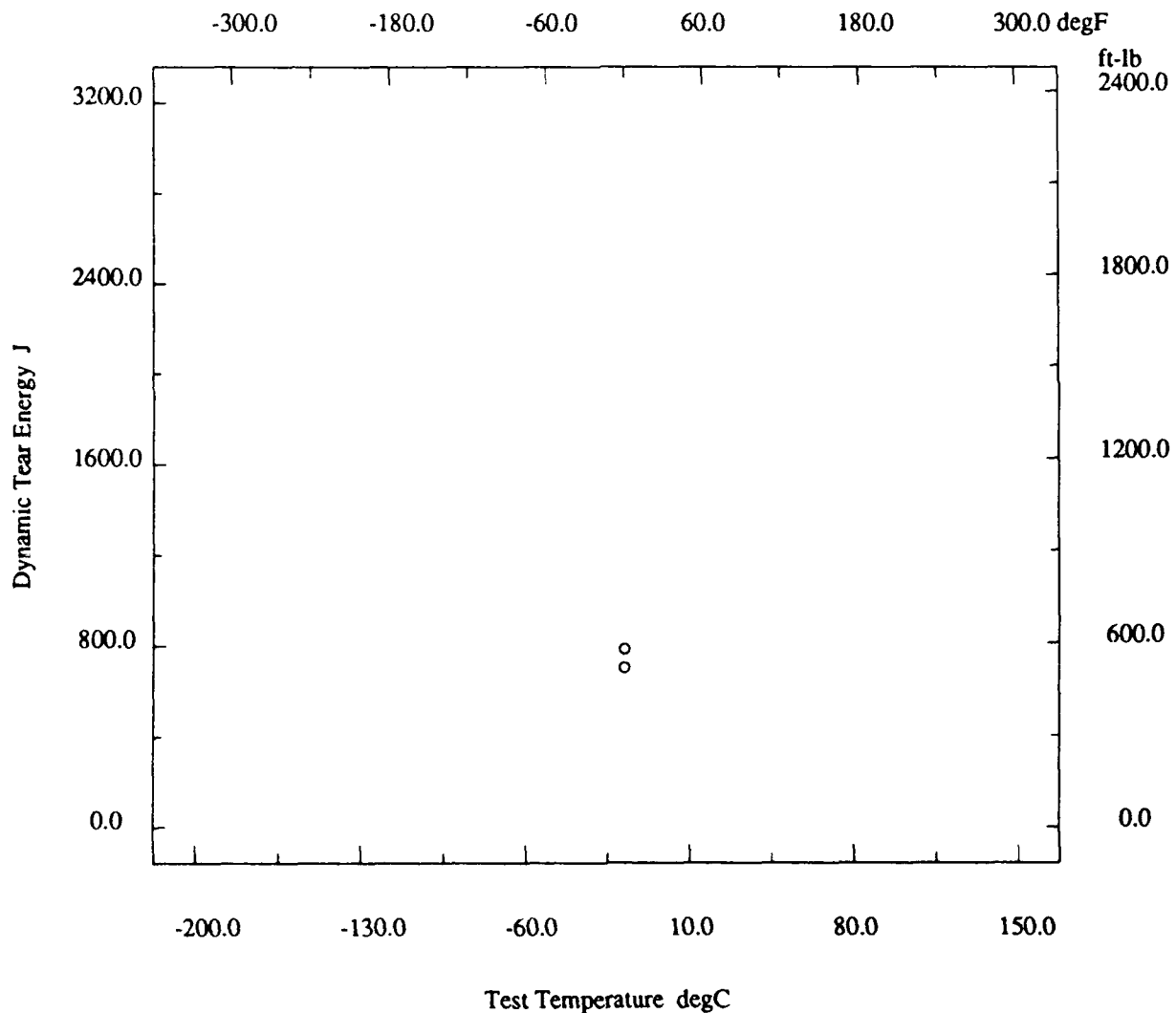
\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.13

Description			
Material Code	011.003.09A	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRO
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.14

<b>Description</b>			
Material Code	011.003.09B	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRP
Reference	USN 6/9		

<b>Composition</b>			
C	0.07 %	Mn	1.26 %
P	0.018 %	S	0.006 %
Si	*	Cr	0.16 %
Ni	3.58 %	Mo	0.44 %
V	<0.001 %	Cu	0.04 %
Cb	*	Ti	<0.01 %
B	*	Al	*
N	*	Other Components	None %

<b>Fabrication History</b>	See Page 19600.7
----------------------------	------------------

<b>Weld</b>			
Weld Code	011.003.09B	Weld Type	SMA
Base Metal Thickness	2.0 in	Welding Position	Downhand
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	M22000/10	Filler Name	*
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	11mm in HAZ	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

<b>Property Measurements</b>			
Test Type	Tensile	Position	*
Specimen Type	Cylindrical	Specimen Thickness	0.250 in
Gage Length	1.0 in	Loading Rate	0.002 in/min
Tensile Strength Offset	0.2 %	Uniform Elongation	*
Tensile Modulus	29.5 ksi*10**3	Standard Method	E 8
Standard Year	1969		

Orient	Test Temp degF	UTS ksi	T <sub>YS</sub> ksi	TYP ksi	Elongation %	RA %
L	Room	126.0	121.0	*	16	59

\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.15

<b>Description</b>		
Material Code	011.003.09B	Material Name HY100
UNS	*	Other Designation *
Type	Welded Joint	Form Plate
Thickness	2.0 in	Composition Type Actual
Composition Position	*	Lot ID FRP
Reference	USN 6/9	
<b>Composition</b>		See Page 19600.14
<b>Fabrication History</b>		See Page 19600.7
<b>Weld</b>		See Page 19600.14
<b>Property Measurements</b>		
Test Type	Fracture Toughness	Position *
Specimen Type	Compact Tension	Specimen Thickness 1.0 in
Crack Length	*	Loading Type I
Loading Rate	*	KQ *
KIc	*	Valid KIc? *
Reason for Invalid	*	KJc *
JIcpr	Modified Standard	Initial COD *
Critical COD	*	Curve Shape *
Initial JI, JI	*	Maximum J, Jmax *
Standard Method	813	Standard Year *

Orien	Test Temp degF	JIc in-lb/in2	Tear Mod in-lb/in**2
T-L	Room	329	19
T-L	Room	338	27
T-L	Room	387	20
T-L	Room	416	13
T-L	Room	456	16
T-L	Room	457	16
T-L	Room	487	14
T-L	Room	494	16
T-L	Room	506	15
T-L	Room	523	15
T-L	Room	588	17

\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.16

<b>Description</b>		
Material Code	011.003.09A	Material Name
UNS	*	Other Designation
Type	Welded Joint	Form
Thickness	2.0 in	Composition Type
Composition Position	*	Lot ID
Reference	USN 6/9	
<b>Composition</b>		See Page 19600.14
<b>Fabrication History</b>		See Page 19600.7
<b>Weld</b>		See Page 19600.14
<b>Property Measurements</b>		
Test Type	Charpy V Impact	Position
Specimen Type	Full	Lateral Expansion
Shear Fracture	*	Did Specimen Fracture?
Did Specimen Split?	*	Standard Method
Standard Year	1972	

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	0	54

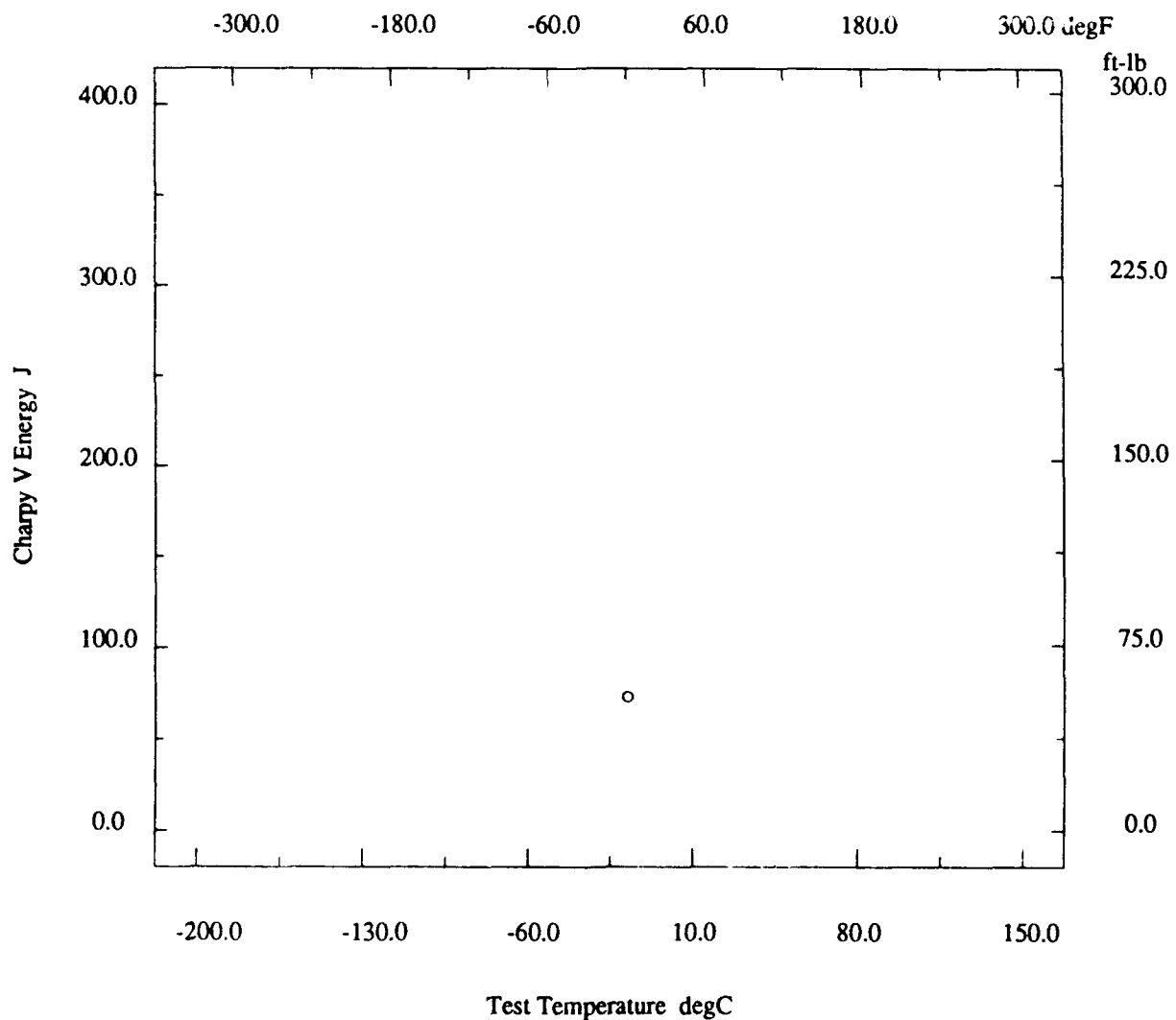
\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.17

Description			
Material Code	011.003.09A	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRP
Reference	USN 6/9		



\* - not reported



# Marine Structural Toughness Data Bank

Material HY100

Page 19600.18

<b>Description</b>	
Material Code .....	011.003.09B
UNS .....	*
Type .....	Welded Joint
Thickness .....	2.0 in
Composition Position .....	*
Reference .....	USN 6/9
Material Name .....	HY100
Other Designation .....	*
Form .....	Plate
Composition Type .....	Actual
Lot ID .....	FRP
<b>Composition</b>	
See Page 19600.14	
<b>Fabrication History</b>	
See Page 19600.7	
<b>Weld</b>	
See Page 19600.14	
<b>Property Measurements</b>	
Test Type .....	Charpy V Impact
Specimen Type .....	Full
Shear Fracture .....	*
Did Specimen Split? .....	*
Standard Year .....	1972
Position .....	*
Lateral Expansion .....	*
Did Specimen Fracture? .....	Assumed
Standard Method .....	E 23

Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-60	52
T-L °	-60	53
T-L °	0	55

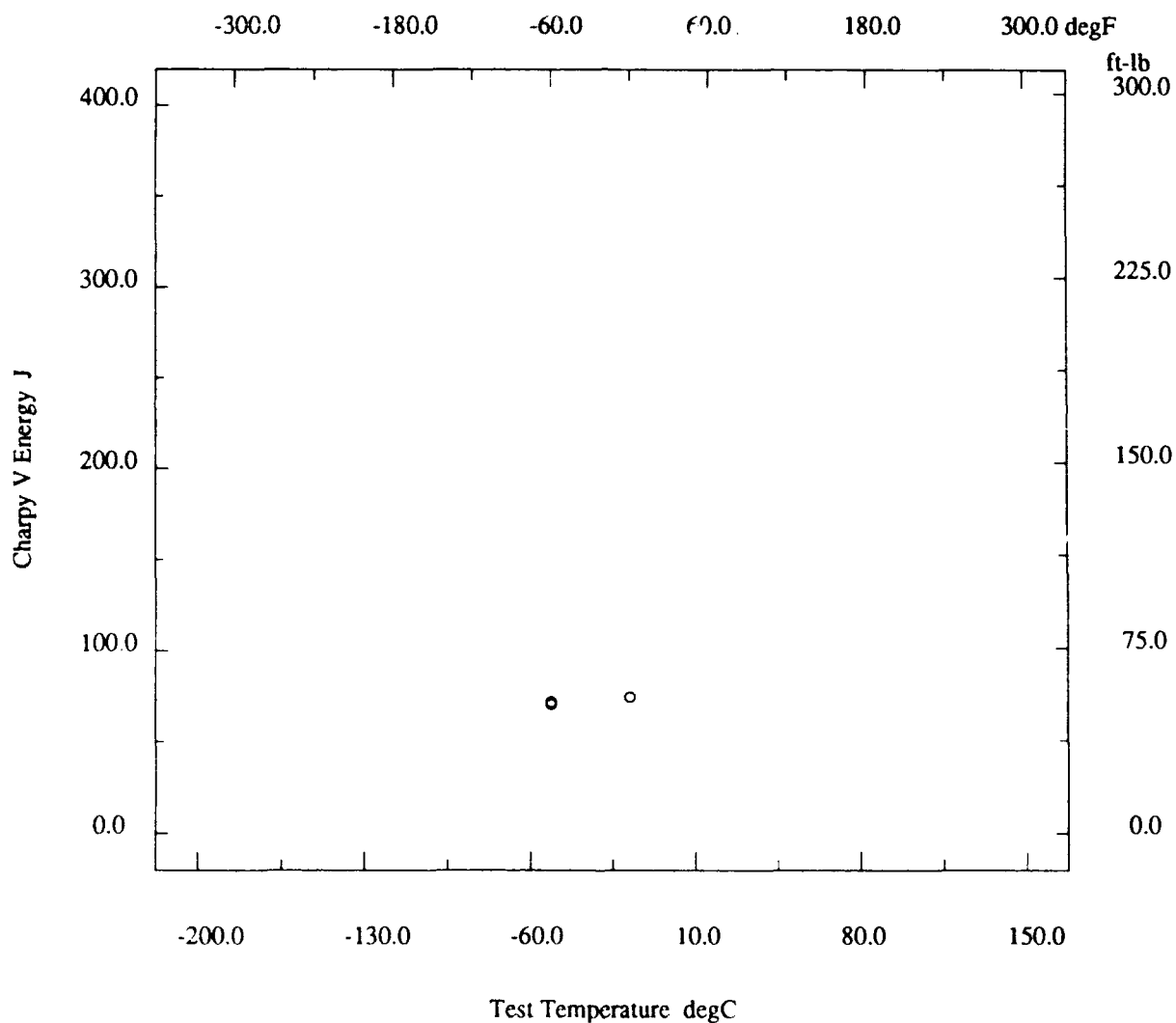
\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.19

Description			
Material Code	011.003.09B	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRP
Reference	USN 6/9		



\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.20

<b>Description</b>		
Material Code	011.003.09B	Material Name HY100
UNS	*	Other Designation *
Type	Welded Joint	Form Plate
Thickness	2.0 in	Composition Type Actual
Composition Position	*	Lot ID FRP
Reference	USN 6/9	
<b>Composition</b>		See Page 19600.14
<b>Fabrication History</b>		See Page 19600.7
<b>Weld</b>		See Page 19600.14
<b>Property Measurements</b>		
Test Type	Dynamic Tear	Position *
Specimen Type	Dynamic Tear	Notch Preparation Pressed
Specimen Thickness	0.625 in	Loading Rate *
Appearance	*	Standard Method E 604
Standard Year	1980	

Orien	Test Temp degF	DT Energy ft-lb
T-L °	0	485
T-L °	0	616

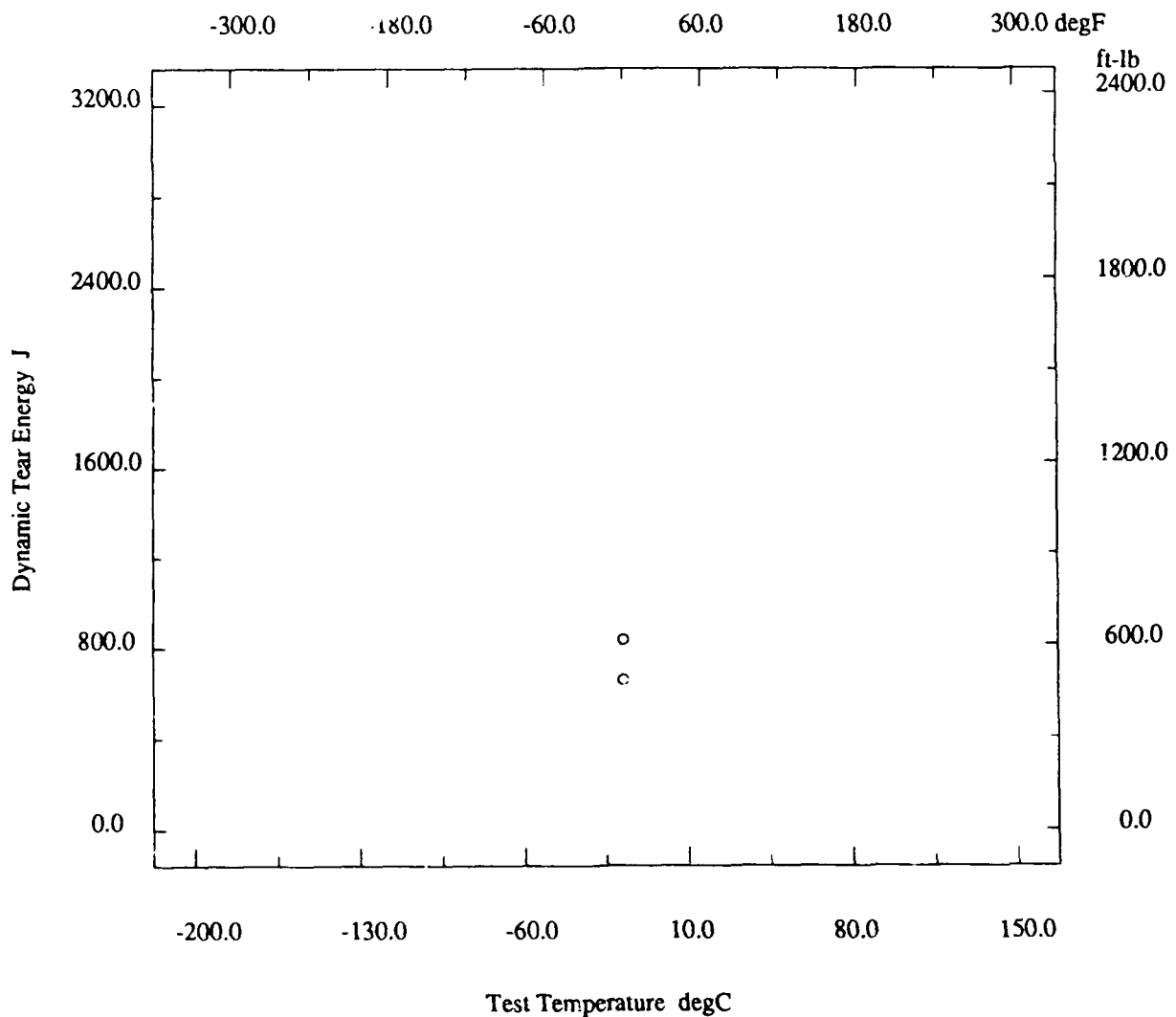
\* - not reported

# Marine Structural Toughness Data Bank

Material HY100

Page 19600.21

Description			
Material Code	011.003.09B	Material Name	HY100
UNS	*	Other Designation	*
Type	Welded Joint	Form	Plate
Thickness	2.0 in	Composition Type	Actual
Composition Position	*	Lot ID	FRP
Reference	USN 6/9		



\* - not reported

# Index

<b>0 Lot ID</b>	3800.1-3800.4	19200.1, 19300.1, 19400.1, 19600.7, 19600.14
<b>004-2 Reference</b>	1100.1-1100.2, 1100.5-1100.6, 1200.1-1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5- 1300.6, 1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-1500.6, 1600.1-1600.2, 1600.5-1600.6, 1700.1- 1700.2, 1700.5-1700.6, 1800.1-1800.2, 1800.5-1800.6, 1900.1-1900.2, 1900.5-1900.6	<b>1/2 V-Groove Joint Preparation</b> 13800.8- 13800.36, 13900.1, 13900.4-13900.26, 14000.1- 14000.22
<b>007-1 Reference</b>	2100.1-2100.8, 2200.1-2200.8, 2300.1 2300.8, 2400.1-2400.20, 2500.1-2500.18, 2600.1-2600.20, 2700.1-2700.18	<b>1211 Reference</b> 9000.1-9000.2, 9000.5-9000.9, 9100.1- 9100.3, 9100.6-9100.9
<b>007-4 Reference</b>	2800.1-2800.8, 2900.1-2900.8, 3000.1-3000.8	<b>14320 Lot ID</b> 3600.1-3600.4
<b>1 Lot ID</b>	3900.1-3900.3	<b>14453 Lot ID</b> 4500.1-4500.4
<b>1010 Reference</b>	7800.1-7800.6, 7900.1-7900.6	<b>14460 Lot ID</b> 3300.1-3300.4
<b>1120 Reference</b>	16600.1-16600.7	<b>14490 Lot ID</b> 5700.1-5700.3
<b>11672 Lot ID</b>	3400.1-3400.4	<b>14500 Lot ID</b> 6000.1-6000.3
<b>11682 Lot ID</b>	4600.1-4600.3	<b>1/4T Composition Position</b> 13800.1-13800.37, 13900.1-13900.26, 14000.1-14000.23
<b>11692 Lot ID</b>	4200.1-4200.3	<b>1/4T Location wrt Surface</b> 7200.7-7200.8, 7200.13
<b>11mm in HAZ Location wrt Weld</b>	2500.16, 2700.16, 3200.1, 3200.8, 3200.12, 3200.16, 3200.20, 6400.4, 6400.10, 6400.16, 6500.1, 6600.1, 6700.1, 6800.1, 7200.7-7200.8, 7500.1, 7500.6, 7500.12, 7500.16, 7500.20, 7600.2, 7600.6, 7600.10, 7600.14, 7600.18, 7700.1, 7700.6, 7700.10, 7700.14, 7700.18, 8000.1, 8100.1, 8200.1, 8300.1, 8500.1, 8600.1, 8700.1, 8800.1, 9200.2, 9200.6, 9200.10, 9200.14, 9200.18, 9300.1, 9300.6, 9300.10, 9300.14, 9300.18, 9700.7, 9900.7, 10200.4, 10200.8, 10500.4, 10800.4, 10900.4, 11000.4, 11500.4, 12300.4, 12300.8, 12300.12, 13800.8, 13800.20, 13800.24, 13800.34, 13900.1, 13900.14, 13900.24, 14000.1, 14000.4, 14000.14, 14200.1, 14200.4-14200.6, 14200.16-14200.18, 14200.28, 14200.38-14200.40, 14300.1, 14300.4-14300.6, 14300.16- 14300.18, 14300.28, 14300.38-14300.40, 14400.1, 14400.4-14400.6, 14400.16-14400.18, 14400.28, 14400.38-14400.40, 14500.1, 14500.4-14500.6, 14500.16, 14500.26, 14500.36, 14600.1, 14600.4-14600.6, 14600.16, 14600.26, 14600.36, 14700.1-14700.3, 14700.6- 14700.8, 14700.11-14700.12, 14700.15-14700.17, 14700.20-14700.21, 14700.24-14700.26, 14800.1- 14800.3, 14800.6-14800.8, 14800.11-14800.12, 14800.15- 14800.17, 14800.20-14800.21, 14800.24-14800.26, 14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12, 14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8, 15000.11-15000.12, 15000.15-15000.17, 15000.20- 15000.21, 15000.24-15000.26, 15100.1-15100.3, 15100.6-15100.8, 15100.11-15100.12, 15100.15- 15100.17, 15100.20-15100.21, 15100.24-15100.26, 15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12, 15200.15-15200.17, 16500.1, 16500.5, 19000.1, 19100.1,	<b>17754 Lot ID</b> 5800.1-5800.3, 6100.1-6100.3 <b>17777 Lot ID</b> 6200.1-6200.3 <b>17846 Lot ID</b> 5900.1-5900.3 <b>18553 Lot ID</b> 6300.1-6300.3 <b>1969 Standard Year</b> 1000.14, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14 <b>1971 Year Produced</b> 1000.1-1000.3, 1000.6, 1000.9, 1000.12-1000.14 <b>1972 Standard Year</b> 18600.3, 18700.2, 18800.3, 18900.3, 19600.3, 19600.10, 19600.16-19600.18 <b>1972 Year Produced</b> 2100.1-2100.3, 2100.6, 2200.1- 2200.3, 2200.6, 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1- 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 2800.1-2800.3, 2800.6, 2900.1-2900.3, 2900.6, 3000.1-3000.3, 3000.6 <b>1976 Standard Year</b> 7100.5, 7200.5, 7200.11, 7200.15 <b>1976 Year Produced</b> 15300.1, 15400.1, 16000.1, 16200.1 <b>1977 Year Produced</b> 16100.1, 16600.1 <b>1978 Year Produced</b> 7300.1, 15500.1, 15600.1, 15900.1 <b>1979 Standard Year</b> 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11 <b>1979 Year Produced</b> 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 15700.1, 15800.1, 16300.1, 16400.1 <b>1980 Standard Year</b> 18600.5, 18700.4, 18800.5, 18900.5, 19600.5, 19600.12, 19600.20 <b>1980 Year Produced</b> 9000.1, 9100.1 <b>1981 Standard Year</b> 16500.2-16500.6

- 1981 Year Produced** 17400.1, 17400.11, 17400.20  
**1982 Year Produced** 12600.1, 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5, 19500.1  
**1983 Year Produced** 7800.1, 7900.1  
**1984 Year Produced** 12500.1, 12700.1  
**1987 Standard Year** 7800.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2  
**1G Welding Position** 14800.11-14800.12, 14800.15-14800.17  
**1mm in HAZ Location wrt Weld** 2500.4, 2700.4, 6400.7, 6400.13, 6400.19-6400.21, 6500.4, 6600.4, 6700.4, 6800.4, 7200.13, 8000.4, 8100.4, 8200.4, 8300.4, 8500.4, 8600.4, 8700.4, 8800.4, 13800.12, 13800.28, 13900.6, 13900.18, 14000.8, 14000.18, 14200.10, 14200.22, 14200.32, 14200.44, 14300.10, 14300.22, 14300.32, 14300.44, 14400.10, 14400.22, 14400.32, 14400.44, 14500.10, 14500.20, 14500.30, 14500.40, 14600.10, 14600.20, 14600.30, 14600.40  
**2/3 Specimen Type** 9400.2, 9600.2  
**2G Welding Position** 14700.11-14700.12, 14700.15-14700.17, 14800.20-14800.21, 14800.24-14800.26  
**3200 Reference** 12600.1-12600.14  
**3201 Reference** 15400.1-15400.6, 15700.1-15700.3, 15700.6-15700.8, 15800.1-15800.3, 15800.6-15800.8, 15900.1-15900.6, 16000.1-16000.6, 16100.1-16100.3, 16100.6-16100.8, 16200.1-16200.6, 16300.1-16300.6  
**3202 Reference** 15300.1-15300.6, 15500.1-15500.2, 15500.5-15500.7, 15600.1-15600.6, 16400.1-16400.6  
**3/4 Specimen Type** 9500.2, 9500.5, 9700.2, 9700.5-9700.9, 9800.2, 9900.2, 9900.5-9900.9, 10200.2-10200.10, 11300.2, 11400.2, 11500.2, 11600.2, 11700.2, 11700.5  
**3400 Reference** 12500.1-12500.6, 12700.1-12700.7  
**3530 Reference** 19500.1-19500.7  
**3G Welding Position** 14700.20-14700.21, 14700.24-14700.26, 14900.1-14900.3, 14900.6-14900.8, 15000.20-15000.21, 15000.24-15000.26, 15100.1-15100.3, 15100.6-15100.8, 15100.20-15100.21, 15100.24-15100.26, 15200.11-15200.12, 15200.15-15200.17  
**3mm in HAZ Location wrt Weld** 2500.7, 2700.7, 13800.14, 13800.30, 13900.8, 13900.20, 14000.10, 14000.20, 14200.12, 14200.24, 14200.34, 14200.46, 14300.12, 14300.24, 14300.34, 14300.46, 14400.12, 14400.24, 14400.34, 14400.46, 14500.12, 14500.22, 14500.32, 14500.42, 14600.12, 14600.22, 14600.32, 14600.42  
**40574 Lot ID** 12000.1-12000.3, 12100.1-12100.3, 12200.1-12200.3  
**41509 Lot ID** 10200.1-10200.11  
**42252 Lot ID** 10800.1-10800.7, 10900.1-10900.7, 11000.1-11000.7  
**43731 Lot ID** 5400.1-5400.3  
**43752 Lot ID** 3500.1-3500.4  
**47444 Lot ID** 11200.1-11200.6  
**47574 Lot ID** 9600.1-9600.7, 9700.1-9700.10, 9800.1-9800.3  
**48160 Lot ID** 9900.1-9900.10, 10000.1-10000.5, 10100.1-10100.5  
**48682 Lot ID** 11500.1-11500.7, 11600.1-11600.3  
**4G Welding Position** 14800.1-14800.3, 14800.6-14800.8, 14900.11-14900.12, 14900.15-14900.17  
**50% weld, 50% HAZ Location wrt Weld** 13800.18, 13900.12  
**50054 Lot ID** 10300.1-10300.3, 10400.1-10400.3, 10500.1-10500.7  
**52100 Lot ID** 12400.1-12400.3  
**52110 Lot ID** 12300.1-12300.15  
**52765 Lot ID** 5600.1-5600.3  
**52797 Lot ID** 5500.1-5500.3  
**54614 Lot ID** 11100.1-11100.4  
**55946 Lot ID** 11800.1-11800.6, 11900.1-11900.6  
**57053 Lot ID** 11700.1-11700.6  
**57221 Lot ID** 9400.1-9400.3, 9500.1-9500.6  
**58568 Lot ID** 11300.1-11300.3, 11400.1-11400.3  
**59609 Lot ID** 10300.4-10300.6, 10600.1-10600.4, 10700.1-10700.7  
**5mm in HAZ Location wrt Weld** 2500.10, 2700.10, 13800.16, 13800.32, 13900.10, 13900.22, 14000.12, 14000.22, 14200.14, 14200.26, 14200.36, 14200.48, 14300.14, 14300.26, 14300.36, 14300.48, 14400.14, 14400.26, 14400.36, 14400.48, 14500.14, 14500.24, 14500.34, 14500.44, 14600.14, 14600.24, 14600.34, 14600.44  
**60865 Lot ID** 4300.1-4300.3  
**60868 Lot ID** 3700.1-3700.4, 4400.1-4400.4  
**641661 Lot ID** 1100.1-1100.2, 1100.5-1100.6, 1200.1-1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6  
**641662 Lot ID** 1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-1500.6, 1600.1-1600.2, 1600.5-1600.6  
**642696 Lot ID** 1800.1-1800.2, 1800.5-1800.6, 1900.1-1900.2, 1900.5-1900.6  
**642697 Lot ID** 1700.1-1700.2, 1700.5-1700.6  
**7mm in HAZ Location wrt Weld** 2500.13, 2700.13  
**813 Standard Method** 18600.2, 18700.1, 18800.2, 18900.2, 19600.2, 19600.9, 19600.15

**A****A Lot ID** 5200.1-5200.4**A0161 Lot ID** 7800.1-7800.6**A1579-2AA Lot ID** 15900.1-15900.6

**A36 Material Name** 3100.1-3100.11, 3200.1-3200.21, 3300.1-3300.4, 3400.1-3400.4, 3500.1-3500.4, 3600.1-3600.4, 3700.1-3700.4, 3800.1-3800.4, 3900.1-3900.3, 4000.1-4000.3, 4100.1-4100.3, 4200.1-4200.3, 4300.1-4300.3, 4400.1-4400.4, 4500.1-4500.4, 4600.1-4600.3, 4700.1-4700.3, 4800.1-4800.3, 4900.1-4900.3, 5000.1-5000.4, 5100.1-5100.4, 5200.1-5200.4, 5300.1-5300.4, 5400.1-5400.3, 5500.1-5500.3, 5600.1-5600.3, 5700.1-5700.3, 5800.1-5800.3, 5900.1-5900.3, 6000.1-6000.3, 6100.1-6100.3, 6200.1-6200.3, 6300.1-6300.3, 6400.1-6400.23, 6500.1-6500.5, 6600.1-6600.5, 6700.1-6700.5, 6800.1-6800.6, 6900.1-6900.2, 7000.1-7000.2, 7000.5-7000.6

**A537 CL1 Material Name** 7300.1-7300.6, 7400.1-7400.11, 7500.1-7500.21

**A572 Gr50 Material Name** 7600.1-7600.21, 7700.1-7700.21, 7800.1-7800.6, 7900.1-7900.6

**A588 GrA Material Name** 9200.1-9200.21, 9300.1-9300.21

**A588 Material Name** 8000.1-8000.5, 8100.1-8100.5, 8200.1-8200.5, 8300.1-8300.5, 8400.1-8400.2, 8500.1-8500.5, 8600.1-8600.5, 8700.1-8700.5, 8800.1-8800.5, 8900.1-8900.2, 9000.1-9000.2, 9000.5-9000.9, 9100.1-9100.3, 9100.6-9100.9

**A6175-8 Lot ID** 16100.1-16100.3, 16100.6-16100.8**A6670-3A Lot ID** 16400.1-16400.6**A6670-3B Lot ID** 16300.1-16300.6

**A710 Material Name** 9400.1-9400.3, 9500.1-9500.6, 9600.1-9600.7, 9700.1-9700.10, 9800.1-9800.3, 9900.1-9900.10, 10000.1-10000.5, 10100.1-10100.5, 10200.1-10200.11, 10300.1-10300.6, 10400.1-10400.3, 10500.1-10500.7, 10600.1-10600.4, 10700.1-10700.7, 10800.1-10800.7, 10900.1-10900.7, 11000.1-11000.7, 11100.1-11100.4, 11200.1-11200.6, 11300.1-11300.3, 11400.1-11400.3, 11500.1-11500.7, 11600.1-11600.3, 11700.1-11700.6, 11800.1-11800.6, 11900.1-11900.6, 12000.1-12000.3, 12100.1-12100.3, 12200.1-12200.3, 12300.1-12300.15, 12400.1-12400.3, 12700.1-12700.7, 12800.1-12800.5, 12900.1-12900.5, 13000.1-13000.5, 13100.1-13100.5, 13200.1-13200.3, 13300.1-13300.5, 13400.1-13400.5, 13500.1-13500.5, 13600.1-13600.5, 13700.1-13700.3

**A710-A Material Name** 12500.1-12500.6, 12600.1-12600.14

**ABS Sec43 Standard Method** 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6

**ABS-B Material Name** 1000.1-1000.14, 1100.1-1100.2, 1100.5-1100.6, 1200.1-1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6, 1400.1-1400.2, 1400.5-

1400.6, 1500.1-1500.2, 1500.5-1500.6, 1600.1-1600.2, 1600.5-1600.6, 1700.1-1700.2, 1700.5-1700.6, 1800.1-1800.2, 1800.5-1800.6, 1900.1-1900.2, 1900.5-1900.6

**ABS-EH32 Material Name** 2000.1-2000.9

**ABS-EH36 Material Name** 2100.1-2100.8, 2200.1-2200.8, 2300.1-2300.8, 2400.1-2400.20, 2500.1-2500.18, 2600.1-2600.20, 2700.1-2700.18, 2800.1-2800.8, 2900.1-2900.8, 3000.1-3000.8

**A,F Heat Treatment** 2800.2, 2800.6, 2900.1-2900.3, 2900.6, 3000.1-3000.3, 3000.6

**A,F,A,F,Q,T Heat Treatment** 2100.2, 2100.6, 2200.1-2200.3, 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1

**A,F,N Heat Treatment** 2800.1-2800.3

**A,K Heat Treatment** 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1

**Al-killed Killing Process** 2800.1-2800.3, 2800.6, 2900.1-2900.3, 2900.6, 3000.1-3000.3, 3000.6

**A,Q,T Final Processing** 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17400.1, 17400.11, 17400.20, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5

**A,Q,T Heat Treatment** 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17400.1, 17400.11, 17400.20, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5

**A,R Final Processing** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 3100.1, 3200.1, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7000.1, 7600.1, 7700.1, 7800.1, 7900.1

**Armco D&M Source** 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1

**Armco Producer** 2000.1, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.1, 7200.1

**Armco Source** 2000.1, 3300.1, 3400.1, 3500.1, 3600.1

**Armco W18 Filler Name** 7200.7-7200.8, 7200.13, 10900.4-10900.6, 11500.4-11500.6

**Armco W24 Filler Name** 10200.4-10200.6, 10800.4-10800.6, 11000.4-11000.6, 12300.4-12300.6

**Armco W25 Filler Name** 9900.7-9900.9

**Armco-MPC Reference** 3300.1-3300.4, 3400.1-3400.4, 3500.1-3500.4, 3600.1-3600.4, 3700.1-3700.4, 3800.1-3800.4, 3900.1-3900.3, 4000.1-4000.3, 4100.1-4100.3, 4200.1-4200.3, 4300.1-4300.3, 4400.1-4400.4, 4500.1-4500.4, 4600.1-4600.3, 4700.1-4700.3, 4800.1-4800.3, 4900.1-4900.3, 5000.1-5000.4, 5100.1-5100.4, 5200.1-5200.4, 5300.1-5300.4, 5400.1-5400.3, 5500.1-5500.3, 5600.1-5600.3, 5700.1-5700.3, 5800.1-5800.3, 5900.1-5900.3, 6000.1-6000.3, 6100.1-6100.3, 6200.1-6200.3, 6300.1-6300.3

**Assumed Did Specimen Fracture?** 1000.3, 1000.6, 1000.9, 1000.12, 2100.3, 2100.6, 2300.3, 2300.6, 2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2-2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2-2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2-3100.10, 3200.2-3200.20, 7100.2, 7300.2, 7400.2-7400.10, 7500.2-7500.20, 7600.2-7600.20, 7700.2-7700.20, 9200.2-9200.20, 9300.2-9300.20, 9400.2, 9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5-9700.9, 9800.2, 9900.2, 9900.5-9900.9, 10100.2, 10200.2-10200.10, 10300.2, 10300.5, 10400.2, 10500.2-10500.6, 10600.1, 10700.2-10700.4, 10800.2-10800.6, 10900.2-10900.6, 11000.2-11000.6, 11100.1, 11200.2, 11200.5, 11300.2, 11400.2, 11500.2-11500.6, 11600.2, 11700.2, 11700.5, 11900.2, 12000.2, 12100.2, 12200.2, 12300.2-12300.14, 12400.2, 13800.8-13800.32, 13900.2-13900.22, 14000.4-14000.22, 14700.4-14700.6, 14700.9, 14700.13-14700.15, 14700.18, 14700.22-14700.24, 14700.27, 14800.4-14800.6, 14800.9, 14800.13-14800.15, 14800.18, 14800.22-14800.24, 14800.27, 14900.4-14900.6, 14900.9, 14900.13-14900.15, 14900.18, 15000.4-15000.6, 15000.9, 15000.13-15000.15, 15000.18, 15000.22-15000.24, 15000.27, 15100.4-15100.6, 15100.9, 15100.13-15100.15, 15100.18, 15100.22-15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-15200.15, 15200.18, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2,

17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16-19600.18

**Australia Producer** 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1

**Australia Source** 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1

## B

**B Location** 1000.2, 1000.6

**B0469-2C Lot ID** 15400.1-15400.6, 16200.1-16200.6

**B1038-2B Lot ID** 18600.1-18600.6

**B-1088-3 Lot ID** 18800.1-18800.6

**B-1088-5 Lot ID** 18900.1-18900.6

**B1908-3 Lot ID** 15500.1-15500.2, 15500.5-15500.7

**B1908-5A Lot ID** 15600.1-15600.6

**B1908-5B Lot ID** 15800.1-15800.3, 15800.6-15800.8

**B5761-2R Lot ID** 19500.1-19500.7

**B8478-3 Lot ID** 17800.1-17800.7

**B8490-2 Lot ID** 17500.1-17500.19

**B8563-4 Lot ID** 17300.1-17300.19

**B8601-5 Lot ID** 17100.1-17100.19

**B8687-1 Lot ID** 17600.1-17600.7

**B8740-2 Lot ID** 17200.1-17200.46

**B8740-3 Lot ID** 16700.1-16700.28

**B8817-1 Lot ID** 18400.1-18400.28

**B9353-3 Lot ID** 16600.1-16600.7

**B9671-1E Lot ID** 12600.1-12600.14

## Back surface at root Location wrt Surface

14200.16, 14200.38, 14300.16, 14300.38, 14400.16, 14400.38, 14500.16-14500.24, 14500.36-14500.44, 14600.16-14600.24, 14600.36-14600.44, 14700.8, 14700.17, 14700.26, 14800.8, 14800.17, 14800.26, 14900.8, 14900.17, 15000.8, 15000.17, 15000.26, 15100.8, 15100.17, 15100.26, 15200.8, 15200.17



**Back surface not root Location wrt Surface**

13800.20-13800.22, 14200.18-14200.26, 14200.40-  
14200.48, 14300.18-14300.26, 14300.40-14300.48,  
14400.18-14400.26, 14400.40-14400.48

**Basic Flux Type** 16500.1, 16500.5

**BL55 Flux Name** 13900.1, 13900.4-13900.26,  
14000.4-14000.22, 14300.1-14300.48, 14400.1-14400.48,  
14500.1-14500.47, 14600.1-14600.47

**BOF Melting Practice** 1000.1-1000.3, 1000.6,  
1000.9, 1000.12-1000.14, 1100.1, 1200.1, 1300.1,  
1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1,  
2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6, 2300.1-  
2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6,  
2600.9, 2600.12, 2600.15, 2600.18, 2700.1

**Bottom Composition Position** 2100.2, 2100.6-  
2100.8, 2200.2, 2200.6-2200.8, 2300.2, 2400.2,  
2400.6-2400.8, 2400.12-2400.14, 2400.18-2400.20,  
2600.2, 2600.6-2600.8, 2600.12-2600.14, 2600.18-  
2600.20, 2800.2, 2800.6-2800.8, 2900.2, 2900.6-  
2900.8, 3000.2, 3000.6-3000.8

**Bottom Ingot Position** 2100.2, 2100.6, 2200.2,  
2200.6, 2300.2, 2400.2, 2400.6, 2400.12, 2400.18,  
2600.2, 2600.6, 2600.12, 2600.18, 16700.20, 16800.5,  
16900.5, 17000.7, 17100.11, 17200.32, 17300.11,  
17400.20, 17500.11, 17600.5, 17700.20, 17800.5,  
17900.32, 18000.7, 18100.7, 18200.20, 18300.32,  
18400.20, 18500.5

**BS131H2 Standard Method** 14700.4-14700.6,  
14700.9, 14700.13-14700.15, 14700.18, 14700.22-  
14700.24, 14700.27, 14800.4-14800.6, 14800.9, 14800.13-  
14800.15, 14800.18, 14800.22-14800.24, 14800.27,  
14900.4-14900.6, 14900.9, 14900.13-14900.15, 14900.18,  
15000.4-15000.6, 15000.9, 15000.13-15000.15, 15000.18,  
15000.22-15000.24, 15000.27, 15100.4-15100.6,  
15100.9, 15100.13-15100.15, 15100.18, 15100.22-  
15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-  
15200.15, 15200.18

**BS4360 Gr50D Material Name** 13800.1-  
13800.37, 13900.1-13900.26, 14000.1-14000.23,  
14100.1-14100.10, 14200.1-14200.49, 14300.1-14300.49,  
14400.1-14400.49, 14500.1-14500.47, 14600.1-14600.47,  
14700.1-14700.28, 14800.1-14800.28, 14900.1-14900.19,  
15000.1-15000.28, 15100.1-15100.28, 15200.1-15200.19,  
15300.1-15300.6, 15400.1-15400.6, 15500.1-15500.2,  
15500.5-15500.7, 15600.1-15600.6, 15700.1-15700.3,  
15700.6-15700.8, 15800.1-15800.3, 15800.6-15800.8,  
15900.1-15900.6, 16000.1-16000.6, 16100.1-16100.3,  
16100.6-16100.8, 16200.1-16200.6, 16300.1-16300.6,  
16400.1-16400.6

**BS5762 Standard Method** 7000.2, 13800.34-  
13800.37, 13900.24-13900.26, 14200.2-14200.5,  
14300.2-14300.5, 14400.2-14400.5, 14500.2-14500.5,

14600.2-14600.5, 14700.2, 14700.11, 14700.20, 14800.2,  
14800.11, 14800.20, 14900.2, 14900.11, 15000.2,  
15000.11, 15000.20, 15100.2, 15100.11, 15100.20,  
15200.2, 15200.11

**Bunge Producer** 16500.1

**C**

**C Lot ID** 4000.1-4000.3

**C4771-39A Lot ID** 18500.1-18500.7

**C5830 Lot ID** 16000.1-16000.6

**C5830-5T Lot ID** 15300.1-15300.6

**C-9283-11 Lot ID** 18700.1-18700.5

**CG A537M Material Name** 7100.1-7100.6,  
7200.1-7200.16

**Charpy V Impact Test Type** 1000.3, 1000.6,  
1000.9, 1000.12, 1100.2, 1200.2, 1300.2, 1400.2,  
1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4,  
2100.3, 2100.6, 2200.3, 2200.6, 2300.3, 2300.6,  
2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18,  
2500.2-2500.4, 2500.7, 2500.10, 2500.13, 2500.16,  
2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18,  
2700.2-2700.4, 2700.7, 2700.10, 2700.13, 2700.16,  
2800.3, 2800.6, 2900.3, 2900.6, 3000. , 3000.6,  
3100.2-3100.10, 3200.2-3200.20, 3300.2, 3400.2,  
3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2,  
4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2,  
4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2,  
5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2,  
5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1,  
6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-  
6400.21, 6500.2-6500.4, 6600.2-6600.4, 6700.2-  
6700.4, 6800.2-6800.4, 6900.1, 7000.5, 7100.2,  
7200.2, 7200.8, 7200.13, 7300.2, 7400.2-7400.10,  
7500.2-7500.20, 7600.2-7600.20, 7700.2-7700.20,  
7800.3, 7900.3, 8000.2-8000.4, 8100.2-8100.4, 8200.2-  
8200.4, 8300.2-8300.4, 8400.1, 8500.2-8500.4, 8600.2-  
8600.4, 8700.2-8700.4, 8800.2-8800.4, 8900.1, 9000.2,  
9100.3, 9200.2-9200.20, 9300.2-9300.20, 9400.2,  
9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5-  
9700.9, 9800.2, 9900.2, 9900.5-9900.9, 10000.2,  
10100.2, 10200.2-10200.10, 10300.2, 10300.5, 10400.2,  
10500.2-10500.6, 10600.1, 10700.2-10700.4, 10800.2-  
10800.6, 10900.2-10900.6, 11000.2-11000.6, 11100.1,  
11200.2, 11200.5, 11300.2, 11400.2, 11500.2-11500.6,  
11600.2, 11700.2, 11700.5, 11800.2, 11800.5, 11900.2-  
11900.4, 12000.2, 12100.2, 12200.2, 12300.2-12300.14,  
12400.2, 12500.3, 12600.3, 12600.6, 12700.3, 12800.2,  
12900.2, 13000.2, 13100.2, 13200.2, 13300.2, 13400.2,  
13500.2, 13600.2, 13700.2, 13800.3-13800.5, 13800.8-  
13800.32, 13900.2-13900.22, 14000.4-14000.22,  
14100.5-14100.9, 14200.6-14200.48, 14300.6-14300.48,  
14400.6-14400.48, 14500.6-14500.44, 14600.6-14600.44,  
14700.4-14700.6, 14700.9, 14700.13-14700.15, 14700.18,

14700.22-14700.24, 14700.27, 14800.4-14800.6,  
14800.9, 14800.13-14800.15, 14800.18, 14800.22-  
14800.24, 14800.27, 14900.4-14900.6, 14900.9, 14900.13-  
14900.15, 14900.18, 15000.4-15000.6, 15000.9, 15000.13-  
15000.15, 15000.18, 15000.22-15000.24, 15000.27,  
15100.4-15100.6, 15100.9, 15100.13-15100.15, 15100.18,  
15100.22-15100.24, 15100.27, 15200.4-15200.6,  
15200.9, 15200.13-15200.15, 15200.18, 15300.2,  
15400.2, 15500.2, 15600.2, 15700.3, 15800.3, 15900.3,  
16000.2, 16100.3, 16200.2, 16300.2, 16400.2, 16500.3,  
16500.6, 16600.2, 16700.2, 16700.6, 16700.9, 16700.12,  
16700.15, 16700.18, 16700.21, 16700.24, 16700.27,  
16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8,  
17100.2, 17100.6, 17100.9, 17100.12, 17100.15,  
17100.18, 17200.2, 17200.8, 17200.13, 17200.18,  
17200.23, 17200.28, 17200.33, 17200.38, 17200.43,  
17300.2, 17300.6, 17300.9, 17300.12, 17300.15,  
17300.18, 17400.2, 17400.6, 17400.9, 17400.12,  
17400.15, 17400.18, 17400.21, 17400.24, 17400.27,  
17500.2, 17500.6, 17500.9, 17500.12, 17500.15,  
17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9,  
17700.12, 17700.15, 17700.18, 17700.21, 17700.24,  
17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13,  
17900.18, 17900.23, 17900.28, 17900.33, 17900.38,  
17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2,  
18200.6, 18200.9, 18200.12, 18200.15, 18200.18,  
18200.21, 18200.24, 18200.27, 18300.2, 18300.8,  
18300.13, 18300.18, 18300.23, 18300.28, 18300.33,  
18300.38, 18300.43, 18400.2, 18400.6, 18400.9,  
18400.12, 18400.15, 18400.18, 18400.21, 18400.24,  
18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3,  
18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4,  
19500.5, 19600.3, 19600.10, 19600.16-19600.18

**Cleavage Curve Shape** 14800.20, 14900.11

**Compact Specimen Type** 7800.2, 9000.6, 9100.2,  
12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2,  
16100.2

**Compact Tension Specimen Type** 18600.2,

18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3,

19300.3, 19400.3, 19600.2, 19600.9, 19600.15

**Composition Position**

**1/4T** 13800.1-13800.37, 13900.1-13900.26, 14000.1-  
14000.23

**Bottom** 2100.2, 2100.6-2100.8, 2200.2, 2200.6-  
2200.8, 2300.2, 2400.2, 2400.6-2400.8, 2400.12-  
2400.14, 2400.18-2400.20, 2600.2, 2600.6-2600.8,  
2600.12-2600.14, 2600.18-2600.20, 2800.2, 2800.6-  
2800.8, 2900.2, 2900.6-2900.8, 3000.2, 3000.6-  
3000.8

**Ladle** 1100.1-1100.2, 1100.5-1100.6, 1200.1-  
1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6,  
1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-  
1500.6, 1600.1-1600.2, 1600.5-1600.6, 1700.1-1700.2,

1700.5-1700.6, 1800.1-1800.2, 1800.5-1800.6, 1900.1-  
1900.2, 1900.5-1900.6, 15500.1-15500.2, 15500.5-  
15500.7, 15600.1-15600.6, 16700.1-16700.28, 16800.1-  
16800.7, 16900.1-16900.7, 17000.1-17000.11, 17100.1-  
17100.19, 17200.1-17200.46, 17300.1-17300.19,  
17400.1-17400.28, 17500.1-17500.19, 17600.1-17600.7,  
17700.1-17700.28, 17800.1-17800.7, 17900.1-17900.46,  
18000.1-18000.11, 18100.1-18100.11, 18200.1-18200.28,  
18300.1-18300.46, 18400.1-18400.28, 18500.1-18500.7

**Top** 2100.1-2100.5, 2200.1-2200.5, 2300.1-2300.8,

2400.1-2400.5, 2400.9-2400.11, 2400.15-2400.17,

2500.1-2500.18, 2600.1-2600.5, 2600.9-2600.11,

2600.15-2600.17, 2700.1-2700.18, 2800.1-2800.5,

2900.1-2900.5, 3000.1-3000.5

**Concast Ingot Position** 1000.1-1000.3, 1000.6,

1000.9, 1000.12-1000.14, 1100.1, 1200.1, 1300.1,

1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1,

2800.1-2800.3, 2800.6, 2900.1-2900.3, 2900.6, 3000.1-  
3000.3, 3000.6

**Curve Shape**

**Cleavage** 14800.20, 14900.11

**Maximum** 15000.2, 15000.20

**Cylindrical Specimen Type** 3100.1, 7000.1,

7300.1, 7400.1, 7600.1, 7800.1, 7900.1, 9000.1,

9100.1, 9200.1, 12500.1, 12600.1, 12700.1, 14700.3,

14700.8, 14700.12, 14700.17, 14700.21, 14700.26,

14800.3, 14800.8, 14800.12, 14800.17, 14800.21,

14800.26, 14900.3, 14900.8, 14900.12, 14900.17,

15000.3, 15000.8, 15000.12, 15000.17, 15000.21,

15000.26, 15100.3, 15100.8, 15100.12, 15100.17,

15100.21, 15100.26, 15200.3, 15200.8, 15200.12,

15200.17, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1,

15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1,

16400.1, 16500.2, 16500.5, 18600.1, 18800.1, 18900.1,

19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1,

19600.8, 19600.14

## D

**D2580-4 Lot ID** 17400.1-17400.28

**D3007-3 Lot ID** 15700.1-15700.3, 15700.6-15700.8

**D3631-7L Lot ID** 16900.1-16900.7

**D3667-3M Lot ID** 17000.1-17000.11

**D3703-4B Lot ID** 16800.1-16800.7

**D3710-42B Lot ID** 17900.1-17900.46

**D3791-2B Lot ID** 7300.1-7300.6

**D3974-1B Lot ID** 18200.1-18200.28

**D3975-3E Lot ID** 17700.1-17700.28

**D4030-4A Lot ID** 18300.1-18300.46

**D4179-3B Lot ID** 7900.1-7900.6

**D6274-4 Lot ID** 9000.1-9000.2, 9000.5-9000.9,

9100.1-9100.3, 9100.6-9100.9

**D6873-1A Lot ID** 12500.1-12500.6

**D6873-1B Lot ID** 12700.1-12700.7

**Did Specimen Fracture?**

**Assumed** 1000.3, 1000.6, 1000.9, 1000.12, 2100.3, 2100.6, 2300.3, 2300.6, 2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2-2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2-2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2-3100.10, 3200.2-3200.20, 7100.2, 7300.2, 7400.2-7400.10, 7500.2-7500.20, 7600.2-7600.20, 7700.2-7700.20, 9200.2-9200.20, 9300.2-9300.20, 9400.2, 9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5-9700.9, 9800.2, 9900.2, 9900.5-9900.9, 10100.2, 10200.2-10200.10, 10300.2, 10300.5, 10400.2, 10500.2-10500.6, 10600.1, 10700.2-10700.4, 10800.2-10800.6, 10900.2-10900.6, 11000.2-11000.6, 11100.1, 11200.2, 11200.5, 11300.2, 11400.2, 11500.2-11500.6, 11600.2, 11700.2, 11700.5, 11900.2, 12000.2, 12100.2, 12200.2, 12300.2-12300.14, 12400.2, 13800.8-13800.32, 13900.2-13900.22, 14000.4-14000.22, 14700.4-14700.6, 14700.9, 14700.13-14700.15, 14700.18, 14700.22-14700.24, 14700.27, 14800.4-14800.6, 14800.9, 14800.13-14800.15, 14800.18, 14800.22-14800.24, 14800.27, 14900.4-14900.6, 14900.9, 14900.13-14900.15, 14900.18, 15000.4-15000.6, 15000.9, 15000.13-15000.15, 15000.18, 15000.22-15000.24, 15000.27, 15100.4-15100.6, 15100.9, 15100.13-15100.15, 15100.18, 15100.22-15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-15200.15, 15200.18, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16-19600.18

**Yes** 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2200.6, 2900.3,

2900.6, 3300.2, 3400.2, 3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.2-6500.4, 6600.2-6600.4, 6700.2-6700.4, 6800.2-6800.4, 6900.1, 8000.2-8000.4, 8100.2-8100.4, 8200.2-8200.4, 8300.2-8300.4, 8400.1, 8500.2-8500.4, 8600.2-8600.4, 8700.2-8700.4, 8800.2-8800.4, 8900.1, 14100.5-14100.9

**Did Specimen Split?**

**No** 8000.2-8000.4, 8100.2-8100.4, 8200.2-8200.4, 8300.2-8300.4, 8400.1, 8500.2-8500.4, 8600.2-8600.4, 8700.2-8700.4, 8800.2-8800.4, 8900.1

**DO733-1D Lot ID** 18000.1-18000.11

**Double Notch Bend Specimen Type** 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

**Double U-Groove Joint Preparation** 10800.4-10800.6, 10900.4-10900.6, 11000.4-11000.6, 12300.4-12300.6

**Double V-Groove Joint Preparation** 7200.7-7200.8, 7200.13, 10500.4-10500.6, 11500.4-11500.6, 12300.8-12300.14, 14500.1-14500.47, 14600.1-14600.47, 16500.1, 16500.5

**Downhand IG Welding Position** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2-3100.10, 3200.1, 3200.4-3200.20, 7400.2-7400.10, 7500.1, 7500.4-7500.20, 14200.1-14200.48, 14300.1-14300.48, 14400.1-14400.48, 14500.1-14500.47, 14600.1-14600.47

**Downhand Welding Position** 7200.7-7200.8, 7200.13, 13800.8-13800.36, 13900.1, 13900.4-13900.26, 14000.1-14000.22, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

**DTNSRDC Producer** 19000.1, 19100.1, 19200.1

**Dynamic Tear Specimen Type** 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9-12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45,

18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6,  
19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12,  
19600.20

**Dynamic Tear Test Type** 2000.8, 7100.5, 7200.5,  
7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7,  
9100.7, 12500.5, 12600.9-12600.13, 12700.6, 12800.4,  
12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4,  
13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7,  
15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5,  
16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10,  
17200.15, 17200.20, 17200.25, 17200.30, 17200.35,  
17200.40, 17200.45, 17900.5, 17900.10, 17900.15,  
17900.20, 17900.25, 17900.30, 17900.35, 17900.40,  
17900.45, 18000.5, 18000.10, 18100.5, 18100.10,  
18300.5, 18300.10, 18300.15, 18300.20, 18300.25,  
18300.30, 18300.35, 18300.40, 18300.45, 18600.5,  
18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6,  
19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

## E

**E 208 Standard Method** 1000.14, 1100.6, 1200.6,  
1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6,  
1900.6, 2000.7, 3300.1, 3400.1, 3500.1, 3600.1,  
3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1,  
4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1,  
4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1,  
5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1,  
6100.1, 6200.1, 6300.1, 7100.4, 7200.4, 7200.10,  
13800.7

**E 23 Standard Method** 7100.2, 16500.3, 16500.6,  
18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4,  
19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16-  
19600.18

**E 604 Standard Method** 2000.8, 7100.5, 7200.5,  
7200.11, 7200.15, 18600.5, 18700.4, 18800.5, 18900.5,  
19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19600.5,  
19600.12, 19600.20

**E 8 Standard Method** 7100.1, 7200.1, 7200.7,  
16500.2, 16500.5, 18600.1, 18800.1, 18900.1, 19000.2,  
19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8,  
19600.14

**E Lot ID** 5300.1-5300.4

**E10018 Filler Specification** 16500.1, 16500.5

**E11018-M Filler Specification** 9900.7-9900.9,  
10200.8-10200.10

**E22000/1E Filler Name** 19100.1, 19200.1, 19300.1,  
19400.1

**E318 Standard Method** 12600.2

**E7018 Filler Specification** 3100.2-3100.10, 7600.2-  
7600.20

**E70-EA2 Filler Specification** 7700.1, 7700.4-  
7700.20

**E72-EW-W Filler Specification** 9300.1, 9300.4-

9300.20

**E8018 Filler Specification** 10500.4-10500.6

**E8018-C1 Filler Specification** 12300.8-12300.14

**E8018C-2 Filler Specification** 9200.2-9200.20,  
9700.7-9700.9

**E8018-C3 Filler Specification** 7400.2-7400.10

**E813 Standard Method** 7800.2, 7900.2, 9000.6,  
9100.2, 12500.2, 12700.2, 15700.2, 15800.2, 15900.2,  
16100.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3

**EF2-F2 Filler Specification** 7500.1, 7500.4-  
7500.20

**electric furnace Melting Practice** 5400.1,  
5500.1, 5600.1

**ESW Weld Type** 6400.4, 6400.7, 6500.1, 6500.4,  
8000.1, 8000.4, 8600.1, 8600.4

## F

**F Heat Treatment** 1000.1-1000.3, 1000.6, 1000.9,  
1000.12-1000.14, 7800.1, 7900.1

**F72-EM12K Filler Specification** 3200.1, 3200.4-  
3200.20

**F96 Flux Type** 7500.1, 7500.4-7500.20

**FCA Weld Type** 14700.1-14700.3, 14700.6-14700.8,  
14700.11-14700.12, 14700.15-14700.17, 14700.20-  
14700.21, 14700.24-14700.26, 14800.1-14800.3,  
14800.6-14800.8, 14800.11-14800.12, 14800.15-  
14800.17, 14800.20-14800.21, 14800.24-14800.26,  
14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12,  
14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8,  
15000.11-15000.12, 15000.15-15000.17, 15000.20-  
15000.21, 15000.24-15000.26, 15100.1-15100.3,  
15100.6-15100.8, 15100.11-15100.12, 15100.15-  
15100.17, 15100.20-15100.21, 15100.24-15100.26,  
15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12,  
15200.15-15200.17

### Filler Alloy

**Hardex-N** 1100.6, 1200.6, 1300.6, 1400.6, 1500.6,  
1600.6, 1700.6, 1800.6, 1900.6, 7100.4, 7200.4,  
7200.10

### Filler Name

**Armco W18** 7200.7-7200.8, 7200.13, 10900.4-  
10900.6, 11500.4-11500.6

**Armco W24** 10200.4-10200.6, 10800.4-10800.6,  
11000.4-11000.6, 12300.4-12300.6

**Armco W25** 9900.7-9900.9

**E22000/1E** 19100.1, 19200.1, 19300.1, 19400.1

**Hobart25P** 6400.4, 6400.7, 6400.10, 6400.13,  
6500.1, 6500.4, 6600.1, 6600.4

**L-50N** 13800.8-13800.36, 14200.1-14200.48

**LindeWS** 8000.1, 8000.4, 8100.1, 8100.4, 8200.1,  
8200.4, 8600.1, 8600.4, 8700.1, 8700.4

**Nk203NiC** 14700.1-14700.3, 14700.6-14700.8,  
14700.11-14700.12, 14700.15-14700.17, 14700.20-

14700.21, 14700.24-14700.26, 14800.1-14800.3,  
14800.6-14800.8, 14800.11-14800.12, 14800.15-  
14800.17, 14800.20-14800.21, 14800.24-14800.26,  
14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12,  
14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8,  
15000.11-15000.12, 15000.15-15000.17, 15000.20-  
15000.21, 15000.24-15000.26, 15100.1-15100.3,  
15100.6-15100.8, 15100.11-15100.12, 15100.15-  
15100.17, 15100.20-15100.21, 15100.24-15100.26,  
15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12,  
15200.15-15200.17

**TW8544** 6400.16, 6400.19-6400.21, 6700.1, 6700.4,  
6800.1, 6800.4, 8300.1, 8300.4, 8500.1, 8500.4,  
8800.1, 8800.4

**W36** 13900.1, 13900.4-13900.26, 14000.1-14000.22,  
14300.1-14300.48, 14400.1-14400.48, 14500.1-14500.47,  
14600.1-14600.47

### Filler Specification

**E10018** 16500.1, 16500.5

**E11018-M** 9900.7-9900.9, 10200.8-10200.10

**E7018** 3100.2-3100.10, 7600.2-7600.20

**E70-EA2** 7700.1, 7700.4-7700.20

**E72-EW-W** 9300.1, 9300.4-9300.20

**E8018** 10500.4-10500.6

**E8018-C1** 12300.8-12300.14

**E8018C-2** 9200.2-9200.20, 9700.7-9700.9

**E8018-C3** 7400.2-7400.10

**EF2-F2** 7500.1, 7500.4-7500.20

**F72-EM12K** 3200.1, 3200.4-3200.20

**M22000/10** 19600.7, 19600.14

**M22000/1E** 19000.1

**PFH-60A** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13,  
2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13,  
2700.16

### Final Processing

**A,Q,T** 16700.1, 16700.11, 16700.20, 16800.1,  
16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1,  
17100.11, 17200.1, 17200.17, 17200.32, 17300.1,  
17300.11, 17400.1, 17400.11, 17400.20, 17500.1,  
17500.11, 17600.1, 17600.5, 17700.1, 17700.11,  
17700.20, 17800.1, 17800.5, 17900.1, 17900.17,  
17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1,  
18200.11, 18200.20, 18300.1, 18300.17, 18300.32,  
18400.1, 18400.11, 18400.20, 18500.1, 18500.5

**A,R** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-  
1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1,  
1600.1, 1700.1, 1800.1, 1900.1, 3100.1, 3200.1,  
3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1,  
3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1,  
4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1,  
5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1,  
5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1,  
6300.1, 7000.1, 7600.1, 7700.1, 7800.1, 7900.1

**H** 14700.1, 14800.1, 14900.1, 15000.1, 15100.1,  
15200.1

**K** 9400.1, 9500.1, 9500.4, 9600.1, 9700.1, 9700.4,  
9800.1, 9900.1, 9900.4, 9900.7, 10000.1, 10100.1,  
10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10600.1,  
10700.1, 10700.4, 10800.1, 10900.1, 11000.1, 11100.1,  
11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1,  
11700.1, 11800.1, 11800.5, 11900.1, 11900.4, 12000.1,  
12100.1, 12200.1, 12300.1, 12400.1

**N** 2000.1, 2800.1-2800.3, 2800.6, 2900.1-2900.3,  
2900.6, 3000.1-3000.3, 3000.6, 7300.1, 7400.1,  
7500.1, 9000.1, 9100.1, 9200.1, 9300.1, 13800.2,  
13800.5, 13900.1, 14000.4, 14100.1, 14200.1, 14300.1,  
14400.1, 14500.1, 14600.1, 15300.1, 15400.1, 15700.1,  
15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1

**N,A** 13800.1-13800.3, 14100.4-14100.5

**N,C,A** 14100.7-14100.9

**Q,K** 12500.1, 12700.1

**Q,T** 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6,  
2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6,  
2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 7100.1,  
7200.1, 12600.1, 16400.1, 18600.1, 18700.1, 18800.1,  
18900.1, 19500.1, 19600.1

**Q,T,W** 19600.7

**W** 19000.1, 19100.1, 19200.1, 19300.1, 19400.1

**Final surface Location wrt Surface** 11500.4-  
11500.6, 12300.4-12300.14, 13800.8-13800.18, 13800.24-  
13800.32, 13900.1, 13900.4-13900.22, 14000.4-  
14000.22, 14200.6-14200.14, 14200.28-14200.36,  
14300.6-14300.14, 14300.28-14300.36, 14400.6-  
14400.14, 14400.28-14400.36, 14500.6-14500.14,  
14500.26-14500.34, 14600.6-14600.14, 14600.26-  
14600.34, 14700.3, 14700.12, 14700.21, 14800.3,  
14800.12, 14800.21, 14900.3, 14900.12, 15000.3,  
15000.12, 15000.21, 15100.3, 15100.12, 15100.21,  
15200.3, 15200.12

**Flat Specimen Type** 13800.1-13800.2

**Flat Welding Position** 9700.7-9700.9, 9900.7-  
9900.9, 10200.4-10200.10, 10800.4-10800.6, 10900.4-  
10900.6, 11000.4-11000.6, 11500.4-11500.6, 12300.4-  
12300.6

### Flux Name

**BL55** 13900.1, 13900.4-13900.26, 14000.4-14000.22,  
14300.1-14300.48, 14400.1-14400.48, 14500.1-14500.47,  
14600.1-14600.47

**Hobart201** 6400.4, 6400.7, 6400.10, 6400.13,  
6400.16, 6400.19-6400.21, 6500.1, 6500.4, 6600.1,  
6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1,  
8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1,  
8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1,  
8700.4, 8800.1, 8800.4

**Linc 860** 7200.7-7200.8, 7200.13

**Linc 880** 11500.4-11500.6  
**Linc 882** 10900.4-10900.6  
**Linde166p** 10200.4-10200.6, 10800.4-10800.6,  
 11000.4-11000.6, 12300.4-12300.6  
**Linde709-5** 9900.7-9900.9  
**US-43** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13,  
 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13,  
 2700.16

**Flux Type**

**Basic** 16500.1, 16500.5  
**F96** 7500.1, 7500.4-7500.20

**Fracture Toughness Test Type** 2000.3, 7000.2,  
 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12600.2,  
 12700.2, 13800.34-13800.37, 13900.24-13900.26,  
 14000.2-14000.3, 14100.3, 14200.2-14200.5, 14300.2-  
 14300.5, 14400.2-14400.5, 14500.2-14500.5, 14600.2-  
 14600.5, 14700.2, 14700.11, 14700.20, 14800.2,  
 14800.11, 14800.20, 14900.2, 14900.11, 15000.2,  
 15000.11, 15000.20, 15100.2, 15100.11, 15100.20,  
 15200.2, 15200.11, 15700.2, 15800.2, 15900.2, 16100.2,  
 16600.1, 18600.2, 18700.1, 18800.2, 18900.2, 19000.3,  
 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9,  
 19600.15

**FRM Lot ID** 19000.1-19000.7

**FRN Lot ID** 19100.1-19100.7

**FRO Lot ID** 19600.7-19600.13

**FRP Lot ID** 19600.14-19600.21

**Full cross section Location wrt Surface** 13800.34-  
 13800.36, 13900.24-13900.26, 14000.1-14000.3,  
 14200.1-14200.5, 14300.1-14300.5, 14400.1-14400.5,  
 14500.1-14500.5, 14600.1-14600.5, 14600.46-14600.47

**Full Specimen Type** 1100.2, 1200.2, 1300.2,  
 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2,  
 2000.4, 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6,  
 2300.1-2300.3, 2300.6, 2400.1-2400.3, 2400.6, 2400.9,  
 2400.12, 2400.15, 2400.18, 2500.2-2500.4, 2500.7,  
 2500.10, 2500.13, 2500.16, 2600.1-2600.3, 2600.6,  
 2600.9, 2600.12, 2600.15, 2600.18, 2700.2-2700.4,  
 2700.7, 2700.10, 2700.13, 2700.16, 2800.3, 2800.6,  
 2900.3, 2900.6, 3000.3, 3000.6, 3100.2-3100.10,  
 3200.2-3200.20, 3700.2, 3800.2, 3900.2, 4000.2,  
 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2,  
 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2,  
 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2,  
 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1,  
 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-  
 6400.21, 6500.2-6500.4, 6600.2-6600.4, 6700.2-  
 6700.4, 6800.2-6800.4, 6900.1, 7000.5, 7100.2,  
 7200.2, 7200.8, 7200.13, 7300.2, 7400.2-7400.10,  
 7500.2-7500.20, 7600.2-7600.20, 7700.2-7700.20,  
 7800.3, 7900.3, 8000.2-8000.4, 8100.2-8100.4, 8200.2-  
 8200.4, 8300.2-8300.4, 8400.1, 8500.2-8500.4, 8600.2-  
 8600.4, 8700.2-8700.4, 8800.2-8800.4, 8900.1, 9000.2,

9100.3, 9200.2-9200.20, 9300.2-9300.20, 10100.2,  
 10300.2, 10300.5, 10400.2, 10500.2-10500.6, 10600.1,  
 10700.2-10700.4, 10800.2-10800.6, 10900.2-10900.6,  
 11000.2-11000.6, 11100.1, 11200.2, 11200.5, 11500.4-  
 11500.6, 11800.2, 11800.5, 11900.2-11900.4, 12000.2,  
 12100.2, 12200.2, 12300.2-12300.14, 12400.2, 12500.3,  
 12600.3, 12600.6, 12700.3, 12800.2, 12900.2, 13000.2,  
 13100.2, 13200.2, 13300.2, 13400.2, 13500.2, 13600.2,  
 13700.2, 13800.8-13800.32, 13900.2-13900.22, 14100.5-  
 14100.9, 14700.4-14700.6, 14700.9, 14700.13-14700.15,  
 14700.18, 14700.22-14700.24, 14700.27, 14800.4-  
 14800.6, 14800.9, 14800.13-14800.15, 14800.18,  
 14800.22-14800.24, 14800.27, 14900.4-14900.6,  
 14900.9, 14900.13-14900.15, 14900.18, 15000.4-  
 15000.6, 15000.9, 15000.13-15000.15, 15000.18,  
 15000.22-15000.24, 15000.27, 15100.4-15100.6,  
 15100.9, 15100.13-15100.15, 15100.18, 15100.22-  
 15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-  
 15200.15, 15200.18, 15300.2, 15400.2, 15500.2,  
 15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3,  
 16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16700.2,  
 16700.6, 16700.9, 16700.12, 16700.15, 16700.18,  
 16700.21, 16700.24, 16700.27, 16800.2, 16800.6,  
 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6,  
 17100.9, 17100.12, 17100.15, 17100.18, 17200.2,  
 17200.8, 17200.13, 17200.18, 17200.23, 17200.28,  
 17200.33, 17200.38, 17200.43, 17300.2, 17300.6,  
 17300.9, 17300.12, 17300.15, 17300.18, 17400.2,  
 17400.6, 17400.9, 17400.12, 17400.15, 17400.18,  
 17400.21, 17400.24, 17400.27, 17500.2, 17500.6,  
 17500.9, 17500.12, 17500.15, 17500.18, 17600.2,  
 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15,  
 17700.18, 17700.21, 17700.24, 17700.27, 17800.2,  
 17800.6, 17900.2, 17900.8, 17900.13, 17900.18,  
 17900.23, 17900.28, 17900.33, 17900.38, 17900.43,  
 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6,  
 18200.9, 18200.12, 18200.15, 18200.18, 18200.21,  
 18200.24, 18200.27, 18300.2, 18300.8, 18300.13,  
 18300.18, 18300.23, 18300.28, 18300.33, 18300.38,  
 18300.43, 18400.2, 18400.6, 18400.9, 18400.12,  
 18400.15, 18400.18, 18400.21, 18400.24, 18400.27,  
 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3,  
 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5,  
 19600.3, 19600.10, 19600.16-19600.18

**Fully Killing Process** 1100.1, 1200.1, 1300.1,  
 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1,  
 2000.1, 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6,  
 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
 2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6,  
 2600.9, 2600.12, 2600.15, 2600.18, 2700.1

**Fusion line Location wrt Weld** 2500.1, 2700.1,  
 3100.2-3100.10, 3200.4-3200.6, 3200.10, 3200.14,  
 3200.18, 7400.2-7400.10, 7500.4, 7500.8-7500.10,

7500.14, 7500.18, 7600.4, 7600.8, 7600.12, 7600.16,  
7600.20, 7700.4, 7700.8, 7700.12, 7700.16, 7700.20,  
9200.4, 9200.8, 9200.12, 9200.16, 9200.20, 9300.4,  
9300.8, 9300.12, 9300.16, 9300.20, 9700.9, 9900.9,  
10200.6, 10200.10, 10500.6, 10800.6, 10900.6, 11000.6,  
11500.6, 12300.6, 12300.10, 12300.14, 13800.10,  
13800.22, 13800.26, 13800.36, 13900.4, 13900.16,  
13900.26, 14000.3, 14000.6, 14000.16, 14200.3-  
14200.5, 14200.8, 14200.20, 14200.30, 14200.42,  
14300.3-14300.5, 14300.8, 14300.20, 14300.30, 14300.42,  
14400.3-14400.5, 14400.8, 14400.20, 14400.30, 14400.42,  
14500.3-14500.5, 14500.8, 14500.18, 14500.28, 14500.38,  
14600.3-14600.5, 14600.8, 14600.18, 14600.28, 14600.38

**FVD Lot ID** 19200.1-19200.7

**FXF Lot ID** 19400.1-19400.7

**FXG Lot ID** 19300.1-19300.7

## G

**G Lot ID** 4100.1-4100.3

**G9011 Lot ID** 2300.1-2300.8

**G9837 Lot ID** 2600.1-2600.20, 2700.1-2700.18

## H

**H Final Processing** 14700.1, 14800.1, 14900.1,  
15000.1, 15100.1, 15200.1

**H Lot ID** 5000.1-5000.4

**Hardex-N Filler Alloy** 1100.6, 1200.6, 1300.6,  
1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6,  
7100.4, 7200.4, 7200.10

## Heat Treatment

**A,F** 2800.2, 2800.6, 2900.1-2900.3, 2900.6, 3000.1-  
3000.3, 3000.6

**A,F,A,F,Q,T** 2100.2, 2100.6, 2200.1-2200.3,  
2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
2400.15, 2400.18, 2500.1

**A,F,N** 2800.1-2800.3

**A,K** 12800.1, 12900.1, 13000.1, 13100.1, 13200.1,  
13300.1, 13400.1, 13500.1, 13600.1, 13700.1

**A,Q,T** 16700.1, 16700.11, 16700.20, 16800.1,  
16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1,  
17100.11, 17200.1, 17200.17, 17200.32, 17300.1,  
17300.11, 17400.1, 17400.11, 17400.20, 17500.1,  
17500.11, 17600.1, 17600.5, 17700.1, 17700.11,  
17700.20, 17800.1, 17800.5, 17900.1, 17900.17,  
17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1,  
18200.11, 18200.20, 18300.1, 18300.17, 18300.32,  
18400.1, 18400.11, 18400.20, 18500.1, 18500.5

**F** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-1000.14,  
7800.1, 7900.1

**N** 7300.1, 9000.1, 9100.1, 15700.1, 15800.1, 15900.1,  
16000.1, 16100.1, 16200.1, 16300.1

**Q,K** 9400.1, 9500.1, 9500.4, 9600.1, 9700.1, 9700.4,  
9800.1, 9900.1, 9900.4, 9900.7, 10000.1, 10100.1,  
10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10600.1,

10700.1, 10700.4, 10800.1, 10900.1, 11000.1, 11100.1,  
11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1,  
11700.1, 11800.1, 11800.5, 11900.1, 11900.4, 12000.1,  
12100.1, 12200.1, 12300.1, 12400.1, 12500.1, 12700.1

**Q,T** 7100.1, 7200.1, 12600.1, 15300.1, 15400.1,  
15500.1, 15600.1, 16400.1, 18600.1, 18700.1, 18800.1,  
18900.1, 19500.1, 19600.1

**Q,T,W** 19600.7

**W** 19000.1, 19100.1, 19200.1, 19300.1, 19400.1

**HIFAB Source** 14700.1, 14800.1, 14900.1, 15000.1,  
15100.1, 15200.1

**Hobart201 Flux Name** 6400.4, 6400.7, 6400.10,  
6400.13, 6400.16, 6400.19-6400.21, 6500.1, 6500.4,  
6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4,  
8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4,  
8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4,  
8700.1, 8700.4, 8800.1, 8800.4

**Hobart25P Filler Name** 6400.4, 6400.7, 6400.10,  
6400.13, 6500.1, 6500.4, 6600.1, 6600.4

**HY100 Material Name** 19500.1-19500.7, 19600.1-  
19600.21

**HY80 Material Name** 16500.1-16500.7, 16600.1-  
16600.7, 16700.1-16700.28, 16800.1-16800.7, 16900.1-  
16900.7, 17000.1-17000.11, 17100.1-17100.19, 17200.1-  
17200.46, 17300.1-17300.19, 17400.1-17400.28,  
17500.1-17500.19, 17600.1-17600.7, 17700.1-17700.28,  
17800.1-17800.7, 17900.1-17900.46, 18000.1-18000.11,  
18100.1-18100.11, 18200.1-18200.28, 18300.1-18300.46,  
18400.1-18400.28, 18500.1-18500.7, 18600.1-18600.6,  
18700.1-18700.5, 18800.1-18800.6, 18900.1-18900.6,  
19000.1-19000.7, 19100.1-19100.7, 19200.1-19200.7,  
19300.1-19300.7, 19400.1-19400.7

## I

**I Loading Type** 18600.2, 18700.1, 18800.2, 18900.2,  
19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2,  
19600.9, 19600.15

**I Lot ID** 5100.1-5100.4

**IG Welding Position** 7600.2-7600.20, 7700.1,  
7700.4-7700.20, 9200.2-9200.20, 9300.1, 9300.4-  
9300.20, 14700.1-14700.3, 14700.6-14700.8, 15000.1-  
15000.3, 15000.6-15000.8, 15000.11-15000.12, 15000.15-  
15000.17, 15100.11-15100.12, 15100.15-15100.17,  
15200.1-15200.3, 15200.6-15200.8

## Ingot Position

**Bottom** 2100.2, 2100.6, 2200.2, 2200.6, 2300.2,  
2400.2, 2400.6, 2400.12, 2400.18, 2600.2, 2600.6,  
2600.12, 2600.18, 16700.20, 16800.5, 16900.5, 17000.7,  
17100.11, 17200.32, 17300.11, 17400.20, 17500.11,  
17600.5, 17700.20, 17800.5, 17900.32, 18000.7,  
18100.7, 18200.20, 18300.32, 18400.20, 18500.5

**Concast** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-  
1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1,

1600.1, 1700.1, 1800.1, 1900.1, 2800.1-2800.3,  
2800.6, 2900.1-2900.3, 2900.6, 3000.1-3000.3, 3000.6

**Mid** 16700.11, 17200.17, 17400.11, 17700.11,  
17900.17, 18200.11, 18300.17, 18400.11

**Top** 2100.1-2100.3, 2200.1-2200.3, 2300.1-2300.3,  
2400.1-2400.3, 2400.9, 2400.15, 2500.1, 2600.1-  
2600.3, 2600.9, 2600.15, 2700.1, 16700.1, 16800.1,  
16900.1, 17000.1, 17100.1, 17200.1, 17300.1, 17400.1,  
17500.1, 17600.1, 17700.1, 17800.1, 17900.1, 18000.1,  
18100.1, 18200.1, 18300.1, 18400.1, 18500.1

**J**

**J131267 Lot ID** 1000.1-1000.14

**Jlcp**

**Modified Standard** 18600.2, 18700.1, 18800.2,  
18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3,  
19600.2, 19600.9, 19600.15

**Per Standard** 7800.2, 7900.2, 9000.6, 9100.2,  
12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2,  
16100.2

**JISZ3121 Standard Method** 14600.46-14600.47

**Joint Preparation**

**1/2 V-Groove** 13800.8-13800.36, 13900.1,  
13900.4-13900.26, 14000.1-14000.22

**Double U-Groove** 10800.4-10800.6, 10900.4-  
10900.6, 11000.4-11000.6, 12300.4-12300.6

**Double V-Groove** 7200.7-7200.8, 7200.13,  
10500.4-10500.6, 11500.4-11500.6, 12300.8-12300.14,  
14500.1-14500.47, 14600.1-14600.47, 16500.1, 16500.5

**K-Groove** 3100.2-3100.10, 7400.2-7400.10, 7600.2-  
7600.20, 9200.2-9200.20, 9300.1, 9300.4-9300.20,  
14200.1-14200.48, 14300.1-14300.48, 14400.1-14400.48

**No Groove** 6600.1, 6600.4, 6700.1, 6700.4,  
6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4,  
8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4,  
8800.1, 8800.4

**Smooth Butt** 6400.4, 6400.7, 6400.10, 6400.13,  
6400.16, 6400.19-6400.21, 6500.1, 6500.4, 8000.1,  
8000.4, 8600.1, 8600.4, 10200.4-10200.6

**U Groove** 2500.1, 2500.4, 2500.7, 2500.10,  
2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10,  
2700.13, 2700.16

**V Groove** 3200.1, 3200.4-3200.20, 7500.1, 7500.4-  
7500.20, 7700.1, 7700.4-7700.20, 9700.7-9700.9,  
9900.7-9900.9, 10200.8-10200.10, 14700.1-14700.3,  
14700.6-14700.8, 14700.11-14700.12, 14700.15-  
14700.17, 14700.20-14700.21, 14700.24-14700.26,  
14800.1-14800.3, 14800.6-14800.8, 14800.11-14800.12,  
14800.15-14800.17, 14800.20-14800.21, 14800.24-  
14800.26, 14900.1-14900.3, 14900.6-14900.8, 14900.11-  
14900.12, 14900.15-14900.17, 15000.1-15000.3,  
15000.6-15000.8, 15000.11-15000.12, 15000.15-  
15000.17, 15000.20-15000.21, 15000.24-15000.26.

15100.1-15100.3, 15100.6-15100.8, 15100.11-15100.12,  
15100.15-15100.17, 15100.20-15100.21, 15100.24-  
15100.26, 15200.1-15200.3, 15200.6-15200.8, 15200.11-  
15200.12, 15200.15-15200.17

**K**

**K Final Processing** 9400.1, 9500.1, 9500.4, 9600.1,  
9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 9900.7,  
10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1,  
10500.1, 10600.1, 10700.1, 10700.4, 10800.1, 10900.1,  
11000.1, 11100.1, 11200.1, 11200.4, 11300.1, 11400.1,  
11500.1, 11600.1, 11700.1, 11800.1, 11800.5, 11900.1,  
11900.4, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1

**K Killing Process** 5400.1, 5500.1, 5600.1, 5700.1,  
5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1

**K1325 Lot ID** 2400.1-2400.20, 2500.1-2500.18

**k21-6425 Lot ID** 3000.1-3000.8

**K21-7102 Lot ID** 2900.1-2900.8

**K22-6296 Lot ID** 2800.1-2800.8

**KB6479 Lot ID** 2100.1-2100.8, 2200.1-2200.8

**K-Groove Joint Preparation** 3100.2-3100.10,  
7400.2-7400.10, 7600.2-7600.20, 9200.2-9200.20,  
9300.1, 9300.4-9300.20, 14200.1-14200.48, 14300.1-  
14300.48, 14400.1-14400.48

**Killing Process**

**Al-killed** 2800.1-2800.3, 2800.6, 2900.1-2900.3,  
2900.6, 3000.1-3000.3, 3000.6

**Fully** 1100.1, 1200.1, 1300.1, 1400.1, 1500.1,  
1600.1, 1700.1, 1800.1, 1900.1, 2000.1, 2100.1-  
2100.3, 2100.6, 2200.1-2200.3, 2200.6, 2300.1-  
2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6,  
2600.9, 2600.12, 2600.15, 2600.18, 2700.1

**K** 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1,  
6000.1, 6100.1, 6200.1, 6300.1

**Si-Al** 7400.1, 7500.1

**Silicon** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-  
1000.14

**SK** 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1,  
3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1,  
4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1,  
5100.1, 5200.1, 5300.1

**Kobe Producer** 2100.1-2100.3, 2100.6, 2200.1-  
2200.3, 2200.6, 2300.1-2300.3, 2400.1-2400.3, 2400.6,  
2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1-  
2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18,  
2700.1

**Kobe Source** 2100.1-2100.3, 2100.6, 2200.1-2200.3,  
2200.6, 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9,  
2400.12, 2400.15, 2400.18, 2500.1, 2600.1-2600.3,  
2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1

**KONKUL-1 Reference** 3100.1-3100.11, 3200.1-  
3200.21, 7400.1-7400.11, 7500.1-7500.21, 7600.1-



7600.21, 7700.1-7700.21, 9200.1-9200.21, 9300.1-9300.21

**L**

**L467OV559 Lot ID** 19600.1-19600.6

**L-50N Filler Name** 13800.8-13800.36, 14200.1-14200.48

**Ladle Composition Position** 1100.1-1100.2, 1100.5-1100.6, 1200.1-1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6, 1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-1500.6, 1600.1-1600.2, 1600.5-1600.6, 1700.1-1700.2, 1700.5-1700.6, 1800.1-1800.2, 1800.5-1800.6, 1900.1-1900.2, 1900.5-1900.6, 15500.1-15500.2, 15500.5-15500.7, 15600.1-15600.6, 16700.1-16700.28, 16800.1-16800.7, 16900.1-16900.7, 17000.1-17000.11, 17100.1-17100.19, 17200.1-17200.46, 17300.1-17300.19, 17400.1-17400.28, 17500.1-17500.19, 17600.1-17600.7, 17700.1-17700.28, 17800.1-17800.7, 17900.1-17900.46, 18000.1-18000.11, 18100.1-18100.11, 18200.1-18200.28, 18300.1-18300.46, 18400.1-18400.28, 18500.1-18500.7

**Linc 860 Flux Name** 7200.7-7200.8, 7200.13

**Linc 880 Flux Name** 11500.4-11500.6

**Linc 882 Flux Name** 10900.4-10900.6

**Linde166p Flux Name** 10200.4-10200.6, 10800.4-10800.6, 11000.4-11000.6, 12300.4-12300.6

**Linde709-5 Flux Name** 9900.7-9900.9

**LindeWS Filler Name** 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8600.1, 8600.4, 8700.1, 8700.4

**Loading Type**

**I** 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

**Slow** 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

**Location**

**B** 1000.2, 1000.6

**T** 1000.1-1000.3, 1000.9, 1000.12-1000.14

**Location wrt Surface**

**1/4T** 7200.7-7200.8, 7200.13

**Back surface at root** 14200.16, 14200.38, 14300.16, 14300.38, 14400.16, 14400.38, 14500.16-14500.24, 14500.36-14500.44, 14600.16-14600.24, 14600.36-14600.44, 14700.8, 14700.17, 14700.26, 14800.8, 14800.17, 14800.26, 14900.8, 14900.17, 15000.8, 15000.17, 15000.26, 15100.8, 15100.17, 15100.26, 15200.8, 15200.17

**Back surface not root** 13800.20-13800.22, 14200.18-14200.26, 14200.40-14200.48, 14300.18-14300.26, 14300.40-14300.48, 14400.18-14400.26, 14400.40-14400.48

**Final surface** 11500.4-11500.6, 12300.4-12300.14, 13800.8-13800.18, 13800.24-13800.32, 13900.1, 13900.4-13900.22, 14000.4-14000.22, 14200.6-14200.14, 14200.28-14200.36, 14300.6-14300.14, 14300.28-14300.36, 14400.6-14400.14, 14400.28-14400.36, 14500.6-14500.14, 14500.26-14500.34, 14600.6-14600.14, 14600.26-14600.34, 14700.3, 14700.12, 14700.21, 14800.3, 14800.12, 14800.21, 14900.3, 14900.12, 15000.3, 15000.12, 15000.21, 15100.3, 15100.12, 15100.21, 15200.3, 15200.12

**Full cross section** 13800.34-13800.36, 13900.24-13900.26, 14000.1-14000.3, 14200.1-14200.5, 14300.1-14300.5, 14400.1-14400.5, 14500.1-14500.5, 14600.1-14600.5, 14600.46-14600.47

**Mid thickness at root** 3100.2-3100.10, 7400.2-7400.10, 7600.2-7600.20, 9200.2-9200.20, 9900.7-9900.9, 10200.4-10200.6

**Mid thickness not root** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4-3200.20, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 7500.1, 7500.4-7500.20, 7700.1, 7700.4-7700.20, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4, 9300.1, 9300.4-9300.20, 9700.7-9700.9, 10200.8-10200.10, 14700.6, 14700.15, 14700.24, 14800.6, 14800.15, 14800.24, 14900.6, 14900.15, 15000.6, 15000.15, 15000.24, 15100.6, 15100.15, 15100.24, 15200.6, 15200.15

**Surface** 14700.1, 14700.11, 14700.20, 14800.1, 14800.11, 14800.20, 14900.1, 14900.11, 15000.1, 15000.11, 15000.20, 15100.1, 15100.11, 15100.20, 15200.1, 15200.11

**Location wrt Weld**

**11mm in HAZ** 2500.16, 2700.16, 3200.1, 3200.8, 3200.12, 3200.16, 3200.20, 6400.4, 6400.10, 6400.16, 6500.1, 6600.1, 6700.1, 6800.1, 7200.7-7200.8, 7500.1, 7500.6, 7500.12, 7500.16, 7500.20, 7600.2, 7600.6, 7600.10, 7600.14, 7600.18, 7700.1, 7700.6, 7700.10, 7700.14, 7700.18, 8000.1, 8100.1, 8200.1, 8300.1, 8500.1, 8600.1, 8700.1, 8800.1, 9200.2, 9200.6, 9200.10, 9200.14, 9200.18, 9300.1, 9300.6, 9300.10, 9300.14, 9300.18, 9700.7, 9900.7, 10200.4, 10200.8, 10500.4, 10800.4, 10900.4, 11000.4, 11500.4, 12300.4, 12300.8, 12300.12, 13800.8, 13800.20, 13800.24, 13800.34, 13900.1, 13900.14, 13900.24, 14000.1, 14000.4, 14000.14, 14200.1, 14200.4-14200.6, 14200.16-14200.18, 14200.28, 14200.38-14200.40, 14300.1, 14300.4-14300.6, 14300.16-14300.18, 14300.28, 14300.38-14300.40, 14400.1, 14400.4-14400.6, 14400.16-14400.18, 14400.28,

14400.38-14400.40, 14500.1, 14500.4-14500.6, 14500.16, 14500.26, 14500.36, 14600.1, 14600.4-14600.6, 14600.16, 14600.26, 14600.36, 14700.1-14700.3, 14700.6-14700.8, 14700.11-14700.12, 14700.15-14700.17, 14700.20-14700.21, 14700.24-14700.26, 14800.1-14800.3, 14800.6-14800.8, 14800.11-14800.12, 14800.15-14800.17, 14800.20-14800.21, 14800.24-14800.26, 14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12, 14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8, 15000.11-15000.12, 15000.15-15000.17, 15000.20-15000.21, 15000.24-15000.26, 15100.1-15100.3, 15100.6-15100.8, 15100.11-15100.12, 15100.15-15100.17, 15100.20-15100.21, 15100.24-15100.26, 15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12, 15200.15-15200.17, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

**1mm in HAZ** 2500.4, 2700.4, 6400.7, 6400.13, 6400.19-6400.21, 6500.4, 6600.4, 6700.4, 6800.4, 7200.13, 8000.4, 8100.4, 8200.4, 8300.4, 8500.4, 8600.4, 8700.4, 8800.4, 13800.12, 13800.28, 13900.6, 13900.18, 14000.8, 14000.18, 14200.10, 14200.22, 14200.32, 14200.44, 14300.10, 14300.22, 14300.32, 14300.44, 14400.10, 14400.22, 14400.32, 14400.44, 14500.10, 14500.20, 14500.30, 14500.40, 14600.10, 14600.20, 14600.30, 14600.40

**3mm in HAZ** 2500.7, 2700.7, 13800.14, 13800.30, 13900.8, 13900.20, 14000.10, 14000.20, 14200.12, 14200.24, 14200.34, 14200.46, 14300.12, 14300.24, 14300.34, 14300.46, 14400.12, 14400.24, 14400.34, 14400.46, 14500.12, 14500.22, 14500.32, 14500.42, 14600.12, 14600.22, 14600.32, 14600.42

**50% weld, 50% HAZ** 13800.18, 13900.12

**5mm in HAZ** 2500.10, 2700.10, 13800.16, 13800.32, 13900.10, 13900.22, 14000.12, 14000.22, 14200.14, 14200.26, 14200.36, 14200.48, 14300.14, 14300.26, 14300.36, 14300.48, 14400.14, 14400.26, 14400.36, 14400.48, 14500.14, 14500.24, 14500.34, 14500.44, 14600.14, 14600.24, 14600.34, 14600.44

**7mm in HAZ** 2500.13, 2700.13

**Fusion line** 2500.1, 2700.1, 3200.2-3100.10, 3200.4-3200.6, 3200.10, 3200.14, 3200.18, 7400.2-7400.10, 7500.4, 7500.8-7500.12, 7500.14, 7500.18, 7600.4, 7600.8, 7600.12, 7600.16, 7600.20, 7700.4, 7700.8, 7700.12, 7700.16, 7700.20, 9200.4, 9200.8, 9200.12, 9200.16, 9200.20, 9300.4, 9300.8, 9300.12, 9300.16, 9300.20, 9700.9, 9900.9, 10200.6, 10200.10, 10500.6, 10800.6, 10900.6, 11000.6, 11500.6, 12300.6, 12300.10, 12300.14, 13800.10, 13800.22, 13800.26, 13800.36, 13900.4, 13900.16, 13900.26, 14000.3, 14000.6, 14000.16, 14200.3-14200.5, 14200.8, 14200.20, 14200.30, 14200.42, 14300.3-14300.5, 14300.8, 14300.20, 14300.30, 14300.42, 14400.3-14400.5, 14400.8, 14400.20, 14400.30, 14400.42, 14500.3-14500.5, 14500.8, 14500.18,

14500.28, 14500.38, 14600.3-14600.5, 14600.8, 14600.18, 14600.28, 14600.38

**Transverse** 14500.46-14500.47, 14600.46-14600.47  
**Lot ID**

**0** 3800.1-3800.4

**1** 3900.1-3900.3

**11672** 3400.1-3400.4

**11682** 4600.1-4600.3

**11692** 4200.1-4200.3

**14320** 3600.1-3600.4

**14453** 4500.1-4500.4

**14460** 3300.1-3300.4

**14490** 5700.1-5700.3

**14500** 6000.1-6000.3

**17754** 5800.1-5800.3, 6100.1-6100.3

**17777** 6200.1-6200.3

**17846** 5900.1-5900.3

**18553** 6300.1-6300.3

**40574** 12000.1-12000.3, 12100.1-12100.3, 12200.1-12200.3

**41509** 10200.1-10200.11

**42252** 10800.1-10800.7, 10900.1-10900.7, 11000.1-11000.7

**43731** 5400.1-5400.3

**43752** 3500.1-3500.4

**47444** 11200.1-11200.6

**47574** 9600.1-9600.7, 9700.1-9700.10, 9800.1-9800.3

**48160** 9900.1-9900.10, 10000.1-10000.5, 10100.1-10100.5

**48682** 11500.1-11500.7, 11600.1-11600.3

**50054** 10300.1-10300.3, 10400.1-10400.3, 10500.1-10500.7

**52100** 12400.1-12400.3

**52110** 12300.1-12300.15

**52765** 5600.1-5600.3

**52797** 5500.1-5500.3

**54614** 11100.1-11100.4

**55946** 11800.1-11800.6, 11900.1-11900.6

**57053** 11700.1-11700.6

**57221** 9400.1-9400.3, 9500.1-9500.6

**58568** 11300.1-11300.3, 11400.1-11400.3

**59609** 10300.4-10300.6, 10600.1-10600.4, 10700.1-10700.7

**60865** 4300.1-4300.3

**60868** 3700.1-3700.4, 4400.1-4400.4

**641661** 1100.1-1100.2, 1100.5-1100.6, 1200.1-1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6

**641662** 1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-1500.6, 1600.1-1600.2, 1600.5-1600.6

**642696** 1800.1-1800.2, 1800.5-1800.6, 1900.1-1900.2, 1900.5-1900.6

**642697** 1700.1-1700.2, 1700.5-1700.6

**A** 5200.1-5200.4  
**A0161** 7800.1-7800.6  
**A1579-2AA** 15900.1-15900.6  
**A6175-8** 16100.1-16100.3, 16100.6-16100.8  
**A6670-3A** 16400.1-16400.6  
**A6670-3B** 16300.1-16300.6  
**B0469-2C** 15400.1-15400.6, 16200.1-16200.6  
**B1038-2B** 18600.1-18600.6  
**B-1088-3** 18800.1-18800.6  
**B-1088-5** 18900.1-18900.6  
**B1908-3** 15500.1-15500.2, 15500.5-15500.7  
**B1908-5A** 15600.1-15600.6  
**B1908-5B** 15800.1-15800.3, 15800.6-15800.8  
**B5761-2R** 19500.1-19500.7  
**B8478-3** 17800.1-17800.7  
**B8490-2** 17500.1-17500.19  
**B8563-4** 17300.1-17300.19  
**B8601-5** 17100.1-17100.19  
**B8687-1** 17600.1-17600.7  
**B8740-2** 17200.1-17200.46  
**B8740-3** 16700.1-16700.28  
**B8817-1** 18400.1-18400.28  
**B9353-3** 16600.1-16600.7  
**B9671-1E** 12600.1-12600.14  
**C** 4000.1-4000.3  
**C4771-39A** 18500.1-18500.7  
**C5830** 16000.1-16000.6  
**C5830-5T** 15300.1-15300.6  
**C-9283-11** 18700.1-18700.5  
**D2580-4** 17400.1-17400.28  
**D3007-3** 15700.1-15700.3, 15700.6-15700.8  
**D3631-7L** 16900.1-16900.7  
**D3667-3M** 17000.1-17000.11  
**D3703-1B** 16800.1-16800.7  
**D3710-42B** 17900.1-17900.46  
**D3791-2B** 7300.1-7300.6  
**D3974-1B** 18200.1-18200.28  
**D3975-3E** 17700.1-17700.28  
**D4030-4A** 18300.1-18300.46  
**D4179-3B** 7900.1-7900.6  
**D6274-4** 9000.1-9000.2, 9000.5-9000.9, 9100.1-9100.3, 9100.6, 9100.9  
**D6873-1A** 12500.1-12500.6  
**D6873-1B** 12700.1-12700.7  
**DO733-1D** 18000.1-18000.11  
**E** 5300.1-5300.4  
**FRM** 19000.1-19000.7  
**FRN** 19100.1-19100.7  
**FRO** 19600.7, 19600.13  
**FRP** 19600.14, 19600.21  
**FVD** 19200.1-19200.7  
**FXF** 19400.1, 19400.7  
**FXG** 19300.1-19300.7

**G** 4100.1-4100.3  
**G9011** 2300.1-2300.8  
**G9837** 2600.1-2600.20, 2700.1-2700.18  
**H** 5000.1-5000.4  
**I** 5100.1-5100.4  
**J131267** 1000.1-1000.14  
**K1325** 2400.1-2400.20, 2500.1-2500.18  
**k21-6425** 3000.1-3000.8  
**K21-7102** 2900.1-2900.8  
**K22-6296** 2800.1-2800.8  
**KB6479** 2100.1-2100.8, 2200.1-2200.8  
**L467OV559** 19600.1-19600.6  
**N8686-5** 18100.1-18100.11  
**P** 4900.1-4900.3  
**S** 4800.1-4800.3  
**T** 4700.1-4700.3

**LR3201 Reference** 7300.1-7300.6  
**Lukens Producer** 7300.1, 7800.1, 7900.1, 9000.1, 9100.1, 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16600.1, 19500.1  
**Lukens Source** 7300.1, 7800.1, 7900.1, 9000.1, 9100.1, 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16600.1, 19500.1

## M

**M22000/10 Filler Specification** 19600.7, 19600.14  
**M22000/1E Filler Specification** 19000.1  
**Material Code**

**001.001.09B** 16500.1-16500.4  
**001.001.09F** 16500.5-16500.7  
**001.002.01** 16600.1-16600.7  
**001.003.01B1** 16700.20-16700.22  
**001.003.01B2** 16700.26-16700.28  
**001.003.01BM** 16700.23-16700.25  
**001.003.01M1** 16700.11-16700.13  
**001.003.01M2** 16700.17-16700.19  
**001.003.01MM** 16700.14-16700.16  
**001.003.01T1** 16700.1-16700.4  
**001.003.01T2** 16700.8-16700.10  
**001.003.01TM** 16700.5-16700.7  
**001.004.01B2** 16800.5-16800.7  
**001.004.01T1** 16800.1-16800.4  
**001.005.01B2** 16900.5-16900.7  
**001.005.01T1** 16900.1-16900.4  
**001.006.01B2** 17000.7-17000.11  
**001.006.01T1** 17000.1-17000.6  
**001.007.01B1** 17100.11-17100.13  
**001.007.01B2** 17100.17-17100.19  
**001.007.01BM** 17100.14-17100.16  
**001.007.01T1** 17100.1-17100.4  
**001.007.01T2** 17100.8-17100.10

001.007.01TM	17100.5-17100.7	001.016.01B2	18000.7-18000.11
001.008.01B1	17200.32-17200.36	001.016.01T1	18000.1-18000.6
001.008.01B2	17200.42-17200.46	001.017.01B2	18100.7-18100.11
001.008.01BM	17200.37-17200.41	001.017.01T1	18100.1-18100.6
001.008.01M1	17200.17-17200.21	001.018.01B1	18200.20-18200.22
001.008.01M2	17200.27-17200.31	001.018.01B2	18200.26-18200.28
001.008.01MM	17200.22-17200.26	001.018.01BM	18200.23-18200.25
001.008.01T1	17200.1-17200.6	001.018.01M1	18200.11-18200.13
001.008.01T2	17200.12-17200.16	001.018.01M2	18200.17-18200.19
001.008.01TM	17200.7-17200.11	001.018.01MM	18200.14-18200.16
001.009.01B1	17300.11-17300.13	001.018.01T1	18200.1-18200.4
001.009.01B2	17300.17-17300.19	001.018.01T2	18200.8-18200.10
001.009.01BM	17300.14-17300.16	001.018.01TM	18200.5-18200.7
001.009.01T1	17300.1-17300.4	001.019.01B1	18300.32-18300.36
001.009.01T2	17300.8-17300.10	001.019.01B2	18300.42-18300.46
001.009.01TM	17300.5-17300.7	001.019.01BM	18300.37-18300.41
001.010.01B1	17400.20-17400.22	001.019.01M1	18300.17-18300.21
001.010.01B2	17400.26-17400.28	001.019.01M2	18300.27-18300.31
001.010.01BM	17400.23-17400.25	001.019.01MM	18300.22-18300.26
001.010.01M1	17400.11-17400.13	001.019.01T1	18300.1-18300.6
001.010.01M2	17400.17-17400.19	001.019.01T2	18300.12-18300.16
001.010.01MM	17400.14-17400.16	001.019.01TM	18300.7-18300.11
001.010.01T1	17400.1-17400.4	001.020.01B1	18400.20-18400.22
001.010.01T2	17400.8-17400.10	001.020.01B2	18400.26-18400.28
001.010.01TM	17400.5-17400.7	001.020.01BM	18400.23-18400.25
001.011.01B1	17500.11-17500.13	001.020.01M1	18400.11-18400.13
001.011.01B2	17500.17-17500.19	001.020.01M2	18400.17-18400.19
001.011.01BM	17500.14-17500.16	001.020.01MM	18400.14-18400.16
001.011.01T1	17500.1-17500.4	001.020.01T1	18400.1-18400.4
001.011.01T2	17500.8-17500.10	001.020.01T2	18400.8-18400.10
001.011.01TM	17500.5-17500.7	001.020.01TM	18400.5-18400.7
001.012.01B2	17600.5-17600.7	001.021.01B2	18500.5-18500.7
001.012.01T1	17600.1-17600.4	001.021.01T1	18500.1-18500.4
001.013.01B1	17700.20-17700.22	001.023.01	18600.1-18600.6
001.013.01B2	17700.26-17700.28	001.024.01	18700.1-18700.5
001.013.01BM	17700.23-17700.25	001.025.01	18800.1-18800.6
001.013.01M1	17700.11-17700.13	001.026.01	18900.1-18900.6
001.013.01M2	17700.17-17700.19	001.027.09	19000.1-19000.7
001.013.01MM	17700.14-17700.16	001.028.09	19100.1-19100.7
001.013.01T1	17700.1-17700.4	001.029.09	19200.1-19200.7
001.013.01T2	17700.8-17700.10	001.030.09	19300.1-19300.7
001.013.01TM	17700.5-17700.7	001.031.09	19400.1-19400.7
001.014.01B2	17800.5-17800.7	002.001.01A1	9400.1-9400.3
001.014.01T1	17800.1-17800.4	002.001.01B1	9500.1-9500.3
001.015.01B1	17900.32-17900.36	002.001.01B2	9500.4-9500.6
001.015.01B2	17900.42-17900.46	002.002.01A1	9600.1-9600.3
001.015.01BM	17900.37-17900.41	002.002.01A2	9600.4-9600.7
001.015.01M1	17900.17-17900.21	002.002.01B1	9700.1-9700.3
001.015.01M2	17900.27-17900.31	002.002.01B2	9700.4-9700.6
001.015.01MM	17900.22-17900.26	002.002.01C1	9800.1-9800.3
001.015.01T1	17900.1-17900.6	002.002.02B2	9700.9-9700.10
001.015.01T2	17900.12-17900.16	002.002.09B2	9700.7-9700.8
001.015.01TM	17900.7-17900.11	002.003.01A1	9900.1-9900.3

002.003.01A2	9900.4-9900.6	002.017.01C1	12400.1-12400.3
002.003.01B1	10000.1-10000.5	002.018.01	12500.1-12500.6
002.003.01C1	10100.1-10100.5	002.019.01	12600.1-12600.2, 12600.13-12600.14
002.003.02A1	9900.9-9900.10	002.019.01B	12600.6-12600.8, 12600.11-12600.12
002.003.09A1	9900.7-9900.8	002.019.01T	12600.3-12600.5, 12600.9-12600.10
002.004.01A1	10200.1-10200.3	002.020.01	12700.1-12700.7
002.004.02AAA	10200.10-10200.11	002.021.01	12800.1-12800.5
002.004.02ABA	10200.6-10200.7	002.022.01	12900.1-12900.5
002.004.09AAA	10200.8-10200.9	002.023.01	13000.1-13000.5
002.004.09ABA	10200.4-10200.5	002.024.01	13100.1-13100.5
002.005.01A1	10300.1-10300.3	002.025.01	13200.1-13200.3
002.005.01B1	10400.1-10400.3	002.026.01	13300.1-13300.5
002.005.01C1	10500.1-10500.3	002.027.01	13400.1-13400.5
002.005.02C	10500.6-10500.7	002.028.01	13500.1-13500.5
002.005.09C	10500.4-10500.5	002.029.01	13600.1-13600.5
002.006.01A1	10300.4-10300.6	002.030.01	13700.1-13700.3
002.006.01B1	10600.1-10600.4	003.001.01	7100.1-7100.6
002.006.01C1	10700.1-10700.3	003.002.01	7200.1-7200.6
002.006.01C2	10700.4-10700.7	003.002.03.1	7200.13-7200.16
002.007.01A1	10800.1-10800.3	003.002.09	7200.7
002.007.01B1	10900.1-10900.3	003.002.09.1	7200.8-7200.12
002.007.01C1	11000.1-11000.3	003.003.01	7300.1-7300.6
002.007.02AAA	10800.6-10800.7	004.001.01B	1000.2, 1000.6-1000.8
002.007.02BAA	10900.6-10900.7	004.001.01T	1000.1-1000.5, 1000.14
002.007.02CAA	11000.6-11000.7	004.001.01TS1	1000.9-1000.11
002.007.09AAA	10800.4-10800.5	004.001.01TS2	1000.12-1000.13
002.007.09BAA	10900.4-10900.5	004.002.01.1	1100.1-1100.2, 1100.5-1100.6
002.007.09CAA	11000.4-11000.5	004.002.01.2	1200.1-1200.2, 1200.5-1200.6
002.008.01C1	11100.1-11100.4	004.002.01.6	1300.1-1300.2, 1300.5-1300.6
002.009.01B1	11200.1-11200.3	004.003.01.1	1400.1-1400.2, 1400.5-1400.6
002.009.01B2	11200.4-11200.6	004.003.01.2	1500.1-1500.2, 1500.5-1500.6
002.010.01B1	11300.1-11300.3	004.003.01.7	1600.1-1600.2, 1600.5-1600.6
002.010.01C1	11400.1-11400.3	004.004.01.1	1700.1-1700.2, 1700.5-1700.6
002.011.01B1	11500.1-11500.3	004.005.01.1	1800.1-1800.2, 1800.5-1800.6
002.011.01C1	11600.1-11600.3	004.005.01.7	1900.1-1900.2, 1900.5-1900.6
002.011.02B1	11500.6-11500.7	007.001.01B	2100.2, 2100.6-2100.8
002.011.09B1	11500.4-11500.5	007.001.01T	2100.1-2100.5
002.012.01B1	11700.1-11700.3	007.002.01B	2200.2, 2200.6-2200.8
002.012.01B2	11700.4-11700.6	007.002.01T	2200.1-2200.5
002.013.01B1	11800.1-11800.4	007.003.01B	2300.2, 2300.6-2300.8
002.013.01B2	11800.5-11800.6	007.003.01T	2300.1-2300.5
002.013.01C1	11900.1-11900.3	007.004.01B	2400.2, 2400.6-2400.8, 2400.12-2400.14, 2400.18-2400.20
002.013.01C2	11900.4-11900.6	007.004.01T	2400.1-2400.5, 2400.9-2400.11, 2400.15-2400.17
002.014.01B1	12000.1-12000.3	007.004.02.1	2500.1-2500.3
002.014.01C1	12100.1-12100.3	007.004.03.1	2500.4-2500.6
002.015.01C1	12200.1-12200.3	007.004.04.1	2500.7-2500.9
002.016.01C1	12300.1-12300.3	007.004.05.1	2500.10-2500.12
002.016.02CAA	12300.14-12300.15	007.004.06.1	2500.13-2500.15
002.016.02CAS	12300.10-12300.11	007.004.09.1	2500.16-2500.18
002.016.02CBA	12300.6-12300.7	007.005.01B	2600.2, 2600.6-2600.8, 2600.12-2600.14, 2600.18-2600.20
002.016.09CAA	12300.12-12300.13		
002.016.09CAS	12300.8-12300.9		
002.016.09CBA	12300.4-12300.5		

<b>007.005.01T</b>	2600.1-2600.5, 2600.9-2600.11, 2600.15-2600.17	<b>009.033.01</b>	5600.1-5600.3
<b>007.005.02.1</b>	2700.1-2700.3	<b>009.034.01</b>	5700.1-5700.3
<b>007.005.03.1</b>	2700.4-2700.6	<b>009.035.01</b>	5800.1-5800.3
<b>007.005.04.1</b>	2700.7-2700.9	<b>009.036.01</b>	5900.1-5900.2
<b>007.005.05.1</b>	2700.10-2700.12	<b>009.037.01</b>	6000.1-6000.3
<b>007.005.06.1</b>	2700.13-2700.15	<b>009.038.01</b>	6100.1-6100.3
<b>007.005.09.1</b>	2700.16-2700.18	<b>009.039.01</b>	6200.1-6200.3
<b>007.007.01B</b>	2800.2, 2800.6-2800.8	<b>009.040.01</b>	6300.1-6300.3
<b>007.007.01T</b>	2800.1-2800.5	<b>009.041.01</b>	6400.1-6400.3
<b>007.008.01B</b>	2900.2, 2900.6-2900.8	<b>009.041.03A</b>	6400.7-6400.9
<b>007.008.01T</b>	2900.1-2900.5	<b>009.041.03B</b>	6400.13-6400.15
<b>007.009.01B</b>	3000.2, 3000.6-3000.8	<b>009.041.03C</b>	6400.19-6400.20
<b>007.009.01T</b>	3000.1-3000.5	<b>009.041.03D</b>	6400.21-6400.23
<b>009.002.010A</b>	3100.1	<b>009.041.09A</b>	6400.4-6400.6
<b>009.002.02AA</b>	3100.8-3100.9	<b>009.041.09B</b>	6400.10-6400.12
<b>009.002.02AS1</b>	3100.2-3100.3	<b>009.041.09C</b>	6400.16-6400.18
<b>009.002.02AS2</b>	3100.4-3100.5	<b>009.042.01</b>	6900.1-6900.2
<b>009.002.02AS3</b>	3100.6-3100.7	<b>009.042.03A</b>	6500.4-6500.5
<b>009.002.02AS4</b>	3100.10-3100.11	<b>009.042.03B</b>	6600.4-6600.5
<b>009.002.02BS1</b>	3200.6-3200.7	<b>009.042.03C</b>	6700.4-6700.5
<b>009.002.02BS2</b>	3200.10-3200.11	<b>009.042.03D</b>	6800.4-6800.6
<b>009.002.02BS3</b>	3200.14-3200.15	<b>009.042.09A</b>	6500.1-6500.3
<b>009.002.02BS4</b>	3200.18-3200.19	<b>009.042.09B</b>	6600.1-6600.3
<b>009.002.02BW</b>	3200.4-3200.5	<b>009.042.09C</b>	6700.1-6700.3
<b>009.002.09BS1</b>	3200.20-3200.21	<b>009.042.09D</b>	6800.1-6800.3
<b>009.002.09BS2</b>	3200.8-3200.9	<b>009.043.010A</b>	7000.1-7000.2, 7000.5-7000.6
<b>009.002.09BS3</b>	3200.12-3200.13	<b>010.001.010A</b>	13800.2, 13800.5-13800.7, 13800.37
<b>009.002.09BS4</b>	3200.16-3200.17	<b>010.001.010S</b>	13800.1-13800.4
<b>009.002.09BW</b>	3200.1-3200.3	<b>010.001.02ABA</b>	13800.22-13800.23
<b>009.010.01</b>	3300.1-3300.4	<b>010.001.02AFA</b>	13800.10-13800.11
<b>009.011.01</b>	3400.1-3400.4	<b>010.001.02AFS</b>	13800.26-13800.27
<b>009.012.01</b>	3500.1-3500.4	<b>010.001.02ANA</b>	13800.36
<b>009.013.01</b>	3600.1-3600.4	<b>010.001.02BFA</b>	13900.4-13900.5
<b>009.014.01</b>	3700.1-3700.4	<b>010.001.02BFS</b>	13900.16-13900.17
<b>009.015.01</b>	3800.1-3800.4	<b>010.001.02BNA</b>	13900.26
<b>009.016.01</b>	3900.1-3900.3	<b>010.001.02CFA</b>	14000.6-14000.7
<b>009.017.01</b>	4000.1-4000.3	<b>010.001.02CFS</b>	14000.16-14000.17
<b>009.018.01</b>	4100.1-4100.3	<b>010.001.02CNA</b>	14000.3
<b>009.019.01</b>	4200.1-4200.3	<b>010.001.03AFA</b>	13800.12-13800.13
<b>009.020.01</b>	4300.1-4300.3	<b>010.001.03AFS</b>	13800.28-13800.29
<b>009.021.01</b>	4400.1-4400.4	<b>010.001.03BFA</b>	13900.6-13900.7
<b>009.022.01</b>	4500.1-4500.4	<b>010.001.03BFS</b>	13900.18-13900.19
<b>009.023.01</b>	4600.1-4600.3	<b>010.001.03CFA</b>	14000.8-14000.9
<b>009.024.01</b>	4700.1-4700.3	<b>010.001.03CFS</b>	14000.18-14000.19
<b>009.025.01</b>	4800.1-4800.3	<b>010.001.04AFA</b>	13800.14-13800.15
<b>009.026.01</b>	4900.1-4900.3	<b>010.001.04AFS</b>	13800.30-13800.31
<b>009.027.01</b>	5000.1-5000.4	<b>010.001.04BFA</b>	13900.8-13900.9
<b>009.028.01</b>	5100.1-5100.4	<b>010.001.04BFS</b>	13900.20-13900.21
<b>009.029.01</b>	5200.1-5200.4	<b>010.001.04CFA</b>	14000.10-14000.11
<b>009.030.01</b>	5300.1-5300.4	<b>010.001.04CFS</b>	14000.20-14000.21
<b>009.031.01</b>	5400.1-5400.3	<b>010.001.05AFA</b>	13800.16-13800.17
<b>009.032.01</b>	5500.1-5500.3	<b>010.001.05AFS</b>	13800.32-13800.33
		<b>010.001.05BFA</b>	13900.10-13900.11

010.001.05BFS	13900.22-13900.23	010.002.03DFS	14200.32-14200.33
010.001.05CFA	14000.12-14000.13	010.002.03EBA	14300.22-14300.23
010.001.05CFS	14000.22-14000.23	010.002.03EBS	14300.44-14300.45
010.001.09ABA	13800.20-13800.21	010.002.03EFA	14300.10-14300.11
010.001.09AFA	13800.8-13800.9	010.002.03EFS	14300.32-14300.33
010.001.09AFS	13800.24-13800.25	010.002.03FBA	14400.22-14400.23
010.001.09ANA	13800.34	010.002.03FBS	14400.44-14400.45
010.001.09BFA	13900.1-13900.3	010.002.03FFA	14400.10-14400.11
010.001.09BFS	13900.14-13900.15	010.002.03FFS	14400.32-14400.33
010.001.09BNA	13900.24	010.002.03GFA	14500.10-14500.11
010.001.09CFA	14000.4-14000.5	010.002.03GFS	14500.30-14500.31
010.001.09CFS	14000.14-14000.15	010.002.03GRA	14500.20-14500.21
010.001.09CNA	14000.1	010.002.03GRS	14500.40-14500.41
010.001.11AFA	13800.18-13800.19	010.002.03HFA	14600.10-14600.11
010.001.11BFA	13900.12-13900.13	010.002.03HFS	14600.30-14600.31
010.002.010A	14100.1-14100.3	010.002.03HRA	14600.20-14600.21
010.002.010C	14100.5-14100.6	010.002.03HRS	14600.40-14600.41
010.002.010D	14100.7-14100.8	010.002.04DBA	14200.24-14200.25
010.002.010E	14100.9-14100.10	010.002.04DBS	14200.46-14200.47
010.002.010S	14100.4	010.002.04DFA	14200.12-14200.13
010.002.02DBA	14200.20-14200.21	010.002.04DFS	14200.34-14200.35
010.002.02DBS	14200.42-14200.43	010.002.04EBA	14300.24-14300.25
010.002.02DFA	14200.8-14200.9	010.002.04EBS	14300.46-14300.47
010.002.02DFS	14200.30-14200.31	010.002.04EFA	14300.12-14300.13
010.002.02DNA	14200.3	010.002.04EFS	14300.34-14300.35
010.002.02DNS	14200.5	010.002.04FBA	14400.24-14400.25
010.002.02EBA	14300.20-14300.21	010.002.04FBS	14400.46-14400.47
010.002.02EBS	14300.42-14300.43	010.002.04FFA	14400.12-14400.13
010.002.02EFA	14300.8-14300.9	010.002.04FFS	14400.34-14400.35
010.002.02EFS	14300.30-14300.31	010.002.04GFA	14500.12-14500.13
010.002.02ENA	14300.3	010.002.04GFS	14500.32-14500.33
010.002.02ENS	14300.5	010.002.04GRA	14500.22-14500.23
010.002.02FBA	14400.20-14400.21	010.002.04GRS	14500.42-14500.43
010.002.02FBS	14400.42-14400.43	010.002.04HFA	14600.12-14600.13
010.002.02FFA	14400.8-14400.9	010.002.04HFS	14600.32-14600.33
010.002.02FFS	14400.30-14400.31	010.002.04HRA	14600.22-14600.23
010.002.02FNA	14400.3	010.002.04HRS	14600.42-14600.43
010.002.02FNS	14400.5	010.002.05DBA	14200.26-14200.27
010.002.02GFA	14500.8-14500.9	010.002.05DBS	14200.48-14200.49
010.002.02GFS	14500.28-14500.29	010.002.05DFA	14200.14-14200.15
010.002.02GNA	14500.3	010.002.05DFS	14200.36-14200.37
010.002.02GNS	14500.5	010.002.05EBA	14300.26-14300.27
010.002.02GRA	14500.18-14500.19	010.002.05EBS	14300.48-14300.49
010.002.02GRS	14500.38-14500.39	010.002.05EFA	14300.14-14300.15
010.002.02HFA	14600.8-14600.9	010.002.05EFS	14300.36-14300.37
010.002.02HFS	14600.28-14600.29	010.002.05FBA	14400.26-14400.27
010.002.02HNA	14600.3	010.002.05FBS	14400.48-14400.49
010.002.02HNS	14600.5	010.002.05FFA	14400.14-14400.15
010.002.02HRA	14600.18-14600.19	010.002.05FFS	14400.36-14400.37
010.002.02HRS	14600.38-14600.39	010.002.05GFA	14500.14-14500.15
010.002.03DBA	14200.22-14200.23	010.002.05GFS	14500.34-14500.35
010.002.03DBS	14200.44-14200.45	010.002.05GRA	14500.24-14500.25
010.002.03DFA	14200.10-14200.11	010.002.05GRS	14500.44-14500.45

010.002.05HFA	14600.14-14600.15	010.003.09CFA	14700.21-14700.23
010.002.05HFS	14600.34-14600.35	010.003.09CMA	14700.24-14700.25
010.002.05HRA	14600.24-14600.25	010.003.09CSA	14700.20
010.002.05HRS	14600.44-14600.45	010.003.09DBRA	14800.8-14800.10
010.002.09DBA	14200.18-14200.19	010.003.09DFA	14800.3-14800.5
010.002.09DBS	14200.40-14200.41	010.003.09DMA	14800.6-14800.7
010.002.09DFA	14200.6-14200.7	010.003.09DSA	14800.1
010.002.09DFS	14200.28-14200.29	010.003.09EBRA	14800.17-14800.19
010.002.09DNA	14200.1	010.003.09EFA	14800.12-14800.14
010.002.09DNS	14200.4	010.003.09EMA	14800.15-14800.16
010.002.09DRA	14200.16-14200.17	010.003.09ESA	14800.11
010.002.09DRS	14200.38-14200.39	010.003.09FBRA	14800.26-14800.28
010.002.09EBA	14300.18-14300.19	010.003.09FFA	14800.21-14800.23
010.002.09EBS	14300.40-14300.41	010.003.09FMA	14800.24-14800.25
010.002.09EFA	14300.6-14300.7	010.003.09FSA	14800.20
010.002.09EFS	14300.28-14300.29	010.003.09GBRA	14900.8-14900.10
010.002.09ENA	14300.1	010.003.09GFA	14900.3-14900.5
010.002.09ENS	14300.4	010.003.09GMA	14900.6-14900.7
010.002.09ERA	14300.16-14300.17	010.003.09GSA	14900.1
010.002.09ERS	14300.38-14300.39	010.003.09HBRA	14900.17-14900.19
010.002.09FBA	14400.18-14400.19	010.003.09HFA	14900.12-14900.14
010.002.09FBS	14400.40-14400.41	010.003.09HMA	14900.15-14900.16
010.002.09FFA	14400.6-14400.7	010.003.09HSA	14900.11
010.002.09FFS	14400.28-14400.29	010.003.09IBRA	15000.8-15000.10
010.002.09FNA	14400.1	010.003.09IFA	15000.3-15000.5
010.002.09FNS	14400.4	010.003.09IMA	15000.6-15000.7
010.002.09FRA	14400.16-14400.17	010.003.09ISA	15000.1
010.002.09FRS	14400.38-14400.39	010.003.09JBRA	15000.17-15000.19
010.002.09GFA	14500.6-14500.7	010.003.09JFA	15000.12-15000.14
010.002.09GFS	14500.26-14500.27	010.003.09JMA	15000.15-15000.16
010.002.09GNA	14500.1	010.003.09JSA	15000.11
010.002.09GNS	14500.4	010.003.09KBRA	15000.26-15000.28
010.002.09GRA	14500.16-14500.17	010.003.09KFA	15000.21-15000.23
010.002.09GRS	14500.36-14500.37	010.003.09KMA	15000.24-15000.25
010.002.09HFA	14600.6-14600.7	010.003.09KSA	15000.20
010.002.09HFS	14600.26-14600.27	010.003.09LBRA	15100.8-15100.10
010.002.09HNA	14600.1	010.003.09LFA	15100.3-15100.5
010.002.09HNS	14600.4	010.003.09LMA	15100.6-15100.7
010.002.09HRA	14600.16-14600.17	010.003.09LSA	15100.1
010.002.09HRS	14600.36-14600.37	010.003.09MBRA	15100.17-15100.19
010.002.10GSA	14500.46	010.003.09MFA	15100.12-15100.14
010.002.10GSS	14500.47	010.003.09MMA	15100.15-15100.16
010.002.10HSA	14600.46	010.003.09MSA	15100.11
010.002.10HSS	14600.47	010.003.09NBRA	15100.26-15100.28
010.003.09ABRA	14700.8-14700.10	010.003.09NFA	15100.21-15100.23
010.003.09AFA	14700.3-14700.5	010.003.09NMA	15100.24-15100.25
010.003.09AMA	14700.6-14700.7	010.003.09NSA	15100.20
010.003.09ASA	14700.1	010.003.09PBRA	15200.8-15200.10
010.003.09BBRA	14700.17-14700.19	010.003.09PFA	15200.3-15200.5
010.003.09BFA	14700.12-14700.14	010.003.09PMA	15200.6-15200.7
010.003.09BMA	14700.15-14700.16	010.003.09PSA	15200.1
010.003.09BSA	14700.11	010.003.09QBRA	15200.17-15200.19
010.003.09CBRA	14700.26-14700.28	010.003.09QFA	15200.12-15200.14



**010.003.09QMA** 15200.15-15200.16  
**010.003.09QSA** 15200.11  
**010.004.01** 15300.1-15300.6  
**010.005.01** 15400.1-15400.6  
**010.006.01** 15500.1-15500.2, 15500.5-15500.7  
**010.007.01** 15600.1-15600.6  
**010.008.01** 15700.1-15700.3, 15700.6-15700.8  
**010.009.01** 15800.1-15800.3, 15800.6-15800.8  
**010.010.01** 15900.1-15900.6  
**010.011.01** 16000.1-16000.6  
**010.012.01** 16100.1-16100.3, 16100.6-16100.8  
**010.013.01** 16200.1-16200.6  
**010.014.01** 16300.1-16300.6  
**010.015.01** 16400.1-16400.6  
**011.001.01** 19500.1-19500.7  
**011.003.01** 19600.1-19600.6  
**011.003.09A** 19600.7-19600.13, 19600.16-19600.17  
**011.003.09B** 19600.14-19600.15, 19600.18-19600.21  
**012.001.01** 8400.1-8400.2  
**012.001.03A** 8000.4-8000.5  
**012.001.03B** 8100.4-8100.5  
**012.001.03C** 8200.4-8200.5  
**012.001.03D** 8300.4-8300.5  
**012.001.03E** 8500.4-8500.5  
**012.001.09A** 8000.1-8000.3  
**012.001.09B** 8100.1-8100.3  
**012.001.09C** 8200.1-8200.3  
**012.001.09D** 8300.1-8300.3  
**012.001.09E** 8500.1-8500.3  
**012.002.01** 8900.1-8900.2  
**012.002.03A** 8600.4-8600.5  
**012.002.03B** 8700.4-8700.5  
**012.002.03C** 8800.4-8800.5  
**012.002.09A** 8600.1-8600.3  
**012.002.09B** 8700.1-8700.3  
**012.002.09C** 8800.1-8800.3  
**012.003.01** 9000.1-9000.2, 9000.5-9000.9  
**012.004.01** 9100.1-9100.3, 9100.6-9100.9  
**012.005.010A** 9200.1  
**012.005.02AA** 9200.4-9200.5  
**012.005.02AS1** 9200.8-9200.9  
**012.005.02AS2** 9200.12-9200.13  
**012.005.02AS3** 9200.16-9200.17  
**012.005.02AS4** 9200.20-9200.21  
**012.005.02BA** 9300.4-9300.5  
**012.005.02BS1** 9300.8-9300.9  
**012.005.02BS2** 9300.12-9300.13  
**012.005.02BS3** 9300.16-9300.17  
**012.005.02BS4** 9300.20-9300.21  
**012.005.09AA** 9200.2-9200.3  
**012.005.09AS1** 9200.6-9200.7  
**012.005.09AS2** 9200.10-9200.11

**012.005.09AS3** 9200.14-9200.15  
**012.005.09AS4** 9200.18-9200.19  
**012.005.09BA** 9300.1-9300.3  
**012.005.09BS1** 9300.6-9300.7  
**012.005.09BS2** 9300.10-9300.11  
**012.005.09BS3** 9300.14-9300.15  
**012.005.09BS4** 9300.18-9300.19  
**013.004.010A** 7400.1  
**013.004.02AS1** 7400.4-7400.5  
**013.004.02AS2** 7400.6-7400.7  
**013.004.02AS3** 7400.8-7400.9  
**013.004.02AS4** 7400.10-7400.11  
**013.004.02AW** 7400.2-7400.3  
**013.004.02BA** 7500.4-7500.5  
**013.004.02BS2** 7500.10-7500.11  
**013.004.02BS3** 7500.14-7500.15  
**013.004.02BS4** 7500.18-7500.19  
**013.004.09BA** 7500.1-7500.3  
**013.004.09BS1** 7500.6-7500.7  
**013.004.09BS2** 7500.8-7500.9, 7500.20-7500.21  
**013.004.09BS3** 7500.12-7500.13  
**013.004.09BS4** 7500.16-7500.17  
**016.001.010A** 7600.1  
**016.001.02AA** 7600.4-7600.5  
**016.001.02AS1** 7600.8-7600.9  
**016.001.02AS2** 7600.12-7600.13  
**016.001.02AS3** 7600.16-7600.17  
**016.001.02AS4** 7600.20-7600.21  
**016.001.02BA** 7700.4-7700.5  
**016.001.02BS1** 7700.8-7700.9  
**016.001.02BS2** 7700.12-7700.13  
**016.001.02BS3** 7700.16-7700.17  
**016.001.02BS4** 7700.20-7700.21  
**016.001.09AA** 7600.2-7600.3  
**016.001.09AS1** 7600.6-7600.7  
**016.001.09AS2** 7600.10-7600.11  
**016.001.09AS3** 7600.14-7600.15  
**016.001.09AS4** 7600.18-7600.19  
**016.001.09BA** 7700.1-7700.3  
**016.001.09BS1** 7700.6-7700.7  
**016.001.09BS2** 7700.10-7700.11  
**016.001.09BS3** 7700.14-7700.15  
**016.001.09BS4** 7700.18-7700.19  
**016.002.01** 7800.1-7800.6  
**016.003.01** 7900.1-7900.6  
**032.001.01** 2000.1-2000.9

## Material Name

**A36** 3100.1-3100.11, 3200.1-3200.21, 3300.1-3300.4, 3400.1-3400.4, 3500.1-3500.4, 3600.1-3600.4, 3700.1-3700.4, 3800.1-3800.4, 3900.1-3900.3, 4000.1-4000.3, 4100.1-4100.3, 4200.1-4200.3, 4300.1-4300.3, 4400.1-4400.4, 4500.1-4500.4, 4600.1-4600.3, 4700.1-4700.3, 4800.1-4800.3, 4900.1-4900.3, 5000.1-5000.4,

5100.1-5100.4, 5200.1-5200.4, 5300.1-5300.4, 5400.1-5400.3, 5500.1-5500.3, 5600.1-5600.3, 5700.1-5700.3, 5800.1-5800.3, 5900.1-5900.3, 6000.1-6000.3, 6100.1-6100.3, 6200.1-6200.3, 6300.1-6300.3, 6400.1-6400.23, 6500.1-6500.5, 6600.1-6600.5, 6700.1-6700.5, 6800.1-6800.6, 6900.1-6900.2, 7000.1-7000.2, 7000.5-7000.6

**A537 CL1** 7300.1-7300.6, 7400.1-7400.11, 7500.1-7500.21

**A572 Gr50** 7600.1-7600.21, 7700.1-7700.21, 7800.1-7800.6, 7900.1-7900.6

**A588** 8000.1-8000.5, 8100.1-8100.5, 8200.1-8200.5, 8300.1-8300.5, 8400.1-8400.2, 8500.1-8500.5, 8600.1-8600.5, 8700.1-8700.5, 8800.1-8800.5, 8900.1-8900.2, 9000.1-9000.2, 9000.5-9000.9, 9100.1-9100.3, 9100.6-9100.9

**A588 GrA** 9200.1-9200.21, 9300.1-9300.21

**A710** 9400.1-9400.3, 9500.1-9500.6, 9600.1-9600.7, 9700.1-9700.10, 9800.1-9800.3, 9900.1-9900.10, 10000.1-10000.5, 10100.1-10100.5, 10200.1-10200.11, 10300.1-10300.6, 10400.1-10400.3, 10500.1-10500.7, 10600.1-10600.4, 10700.1-10700.7, 10800.1-10800.7, 10900.1-10900.7, 11000.1-11000.7, 11100.1-11100.4, 11200.1-11200.6, 11300.1-11300.3, 11400.1-11400.3, 11500.1-11500.7, 11600.1-11600.3, 11700.1-11700.6, 11800.1-11800.6, 11900.1-11900.6, 12000.1-12000.3, 12100.1-12100.3, 12200.1-12200.3, 12300.1-12300.15, 12400.1-12400.3, 12400.1-12700.7, 12800.1-12800.5, 12900.1-12900.5, 13000.1-13000.5, 13100.1-13100.5, 13200.1-13200.3, 13300.1-13300.5, 13400.1-1340.5, 13500.1-13500.5, 13600.1-13600.5, 13700.1-13700.3

**A710-A** 12500.1-12500.6, 12600.1-12600.14

**ABS-B** 1000.1-1000.14, 1100.1-1100.2, 1100.5-1100.6, 1200.1-1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6, 1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-1500.6, 1600.1-1600.2, 1600.5-1600.6, 1700.1-1700.2, 1700.5-1700.6, 1800.1-1800.2, 1800.5-1800.6, 1900.1-1900.2, 1900.5-1900.6

**ABS-EH32** 2000.1-2000.9

**ABS-EH36** 2100.1-2100.8, 2200.1-2200.8, 2300.1-2300.8, 2400.1-2400.20, 2500.1-2500.18, 2600.1-2600.20, 2700.1-2700.18, 2800.1-2800.8, 2900.1-2900.8, 3000.1-3000.8

**BS4360 Gr50D** 13800.1-13800.37, 13900.1-13900.26, 14000.1-14000.23, 14100.1-14100.10, 14200.1-14200.49, 14300.1-14300.49, 14400.1-14400.49, 14500.1-14500.47, 14600.1-14600.47, 14700.1-14700.28, 14800.1-14800.28, 14900.1-14900.19, 15000.1-15000.28, 15100.1-15100.28, 15200.1-15200.19, 15300.1-15300.6, 15400.1-15400.6, 15500.1-15500.2, 15500.5-15500.7, 15600.1-15600.6, 15700.1-15700.3, 15700.6-15700.8, 15800.1-15800.3, 15800.6-15800.8, 15900.1-15900.6, 16000.1-16000.6, 16100.1-16100.3, 16100.6-16100.8, 16200.1-16200.6, 16300.1-16300.6, 16400.1-16400.6

**CG A537M** 7100.1-7100.6, 7200.1-7200.16

**HY100** 19500.1-19500.7, 19600.1-19600.21

**HY80** 16500.1-16500.7, 16600.1-16600.7, 16700.1-16700.28, 16800.1-16800.7, 16900.1-16900.7, 17000.1-17000.11, 17100.1-17100.19, 17200.1-17200.46, 17300.1-17300.19, 17400.1-17400.28, 17500.1-17500.19, 17600.1-17600.7, 17700.1-17700.28, 17800.1-17800.7, 17900.1-17900.46, 18000.1-18000.11, 18100.1-18100.11, 18200.1-18200.28, 18300.1-18300.46, 18400.1-18400.28, 18500.1-18500.7, 18600.1-18600.6, 18700.1-18700.5, 18800.1-18800.6, 18900.1-18900.6, 19000.1-19000.7, 19100.1-19100.7, 19200.1-19200.7, 19300.1-19300.7, 19400.1-19400.7

**Maximum Curve Shape** 15000.2, 15000.20

**Melting Practice**

**BOF** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6, 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1

**electric furnace** 5400.1, 5500.1, 5600.1

**open hearth** 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1

**METZ/MPC13 Reference** 2000.1-2000.9

**Mid Ingot Position** 16700.11, 17200.17, 17400.11, 17700.11, 17900.17, 18200.11, 18300.17, 18400.11

**Mid thickness at root Location wrt Surface**

3100.2-3100.10, 7400.2-7400.10, 7600.2-7600.20, 9200.2-9200.20, 9900.7-9900.9, 10200.4-10200.6

**Mid thickness not root Location wrt Surface**

2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4-3200.20, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 7500.1, 7500.4-7500.20, 7700.1, 7700.4-7700.20, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4, 9300.1, 9300.4-9300.20, 9700.7-9700.9, 10200.8-10200.10, 14700.6, 14700.15, 14700.24, 14800.6, 14800.15, 14800.24, 14900.6, 14900.15, 15000.6, 15000.15, 15000.24, 15100.6, 15100.15, 15100.24, 15200.6, 15200.15

**Minsy Producer** 19300.1, 19400.1

**Modified Standard Jicpr** 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

N

**N Final Processing** 2000.1, 2800.1-2800.3, 2800.6,  
2900.1-2900.3, 2900.6, 3000.1-3000.3, 3000.6, 7300.1,  
7400.1, 7500.1, 9000.1, 9100.1, 9200.1, 9300.1,  
13800.2, 13800.5, 13900.1, 14000.4, 14100.1, 14200.1,  
14300.1, 14400.1, 14500.1, 14600.1, 15300.1, 15400.1,  
15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1,  
16300.1

**N Heat Treatment** 7300.1, 9000.1, 9100.1, 15700.1,  
15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1

**N8686-5 Lot ID** 18100.1-18100.11

**N,A Final Processing** 13800.1-13800.3, 14100.4-  
14100.5

**N,C,A Final Processing** 14100.7-14100.9

**NGESW Weld Type** 6400.10, 6400.13, 6400.16,  
6400.19-6400.21, 6600.1, 6600.4, 6700.1, 6700.4,  
6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4,  
8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4,  
8800.1, 8800.4

**Nil Ductility Transition Test Type** 1000.14,  
1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6,  
1700.6, 1800.6, 1900.6, 2000.7, 3300.1, 3400.1,  
3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1,  
4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1,  
4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1,  
5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1,  
5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.4,  
7200.4, 7200.10, 10000.5, 10100.5, 10600.4, 10700.7,  
11100.4, 11800.4, 11900.6, 13800.7, 14100.2

**Nk203NiC Filler Name** 14700.1-14700.3, 14700.6-  
14700.8, 14700.11-14700.12, 14700.15-14700.17,  
14700.20-14700.21, 14700.24-14700.26, 14800.1-  
14800.3, 14800.6-14800.8, 14800.11-14800.12, 14800.15-  
14800.17, 14800.20-14800.21, 14800.24-14800.26,  
14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12,  
14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8,  
15000.11-15000.12, 15000.15-15000.17, 15000.20-  
15000.21, 15000.24-15000.26, 15100.1-15100.3,  
15100.6-15100.8, 15100.11-15100.12, 15100.15-  
15100.17, 15100.20-15100.21, 15100.24-15100.26,  
15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12,  
15200.15-15200.17

**No Did Specimen Split?** 8000.2-8000.4, 8100.2-  
8100.4, 8200.2-8200.4, 8300.2-8300.4, 8400.1, 8500.2-  
8500.4, 8600.2-8600.4, 8700.2-8700.4, 8800.2-8800.4,  
8900.1

**No Groove Joint Preparation** 6600.1, 6600.4,  
6700.1, 6700.4, 6800.1, 6800.4, 8100.1, 8100.4,  
8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4,  
8700.1, 8700.4, 8800.1, 8800.4

**None Shielding Gas** 10500.4-10500.6

**Notch Preparation**

**Pressed** 7100.5, 7200.5, 7200.11, 7200.15, 7300.5,  
7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9-

12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4,  
13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5,  
15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5,  
16100.7, 16200.5, 16300.5, 16400.5, 17000.5, 17000.10,  
17200.5, 17200.10, 17200.15, 17200.20, 17200.25,  
17200.30, 17200.35, 17200.40, 17200.45, 17900.5,  
17900.10, 17900.15, 17900.20, 17900.25, 17900.30,  
17900.35, 17900.40, 17900.45, 18000.5, 18000.10,  
18100.5, 18100.10, 18300.5, 18300.10, 18300.15,  
18300.20, 18300.25, 18300.30, 18300.35, 18300.40,  
18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6,  
19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5,  
19600.12, 19600.20

## O

**OGC Source** 6400.1, 6500.1, 6600.1, 6700.1, 6800.1,  
6900.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1,  
8500.1, 8600.1, 8700.1, 8800.1, 8900.1

**OGC-1 Reference** 6400.1-6400.23, 6500.1-6500.5,  
6600.1-6600.5, 6700.1-6700.5, 6800.1-6800.6, 6900.1-  
6900.2, 8000.1-8000.5, 8100.1-8100.5, 8200.1-8200.5,  
8300.1-8300.5, 8400.1-8400.2, 8500.1-8500.5, 8600.1-  
8600.5, 8700.1-8700.5, 8800.1-8800.5, 8900.1-8900.2

**open hearth Melting Practice** 3300.1, 3400.1,  
3500.1, 3600.1, 3700.1, 4200.1, 4300.1, 4400.1,  
4500.1, 4600.1, 5700.1, 5800.1, 5900.1, 6000.1,  
6100.1, 6200.1, 6300.1

**OrStMills Producer** 6400.1, 8600.1, 8700.1, 8800.1,  
8900.1

## P

**P Lot ID** 4900.1-4900.3

**P-1 Specimen Type** 1000.14, 1100.6, 1200.6,  
1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6,  
1900.6, 13800.7, 14100.2

**P-2 Specimen Type** 10600.4, 10700.7, 11100.4,  
11800.4, 11900.6

**P-3 Specimen Type** 7100.4, 7200.4, 7200.10,  
10000.5, 10100.5

**Per Standard JIcpr** 7800.2, 7900.2, 9000.6, 9100.2,  
12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2,  
16100.2

**P&EStat Source** 16500.1

**PFH-60A Filler Specification** 2500.1, 2500.4,  
2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4,  
2700.7, 2700.10, 2700.13, 2700.16

**Pressed Notch Preparation** 7100.5, 7200.5,  
7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7,  
9100.7, 12500.5, 12600.9-12600.13, 12700.6, 12800.4,  
12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4,  
13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7,  
15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5,  
16400.5, 17000.5, 17000.10, 17200.5, 17200.10,  
17200.15, 17200.20, 17200.25, 17200.30, 17200.35,

17200.40, 17200.45, 17900.5, 17900.10, 17900.15,  
17900.20, 17900.25, 17900.30, 17900.35, 17900.40,  
17900.45, 18000.5, 18000.10, 18100.5, 18100.10,  
18300.5, 18300.10, 18300.15, 18300.20, 18300.25,  
18300.30, 18300.35, 18300.40, 18300.45, 18600.5,  
18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6,  
19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

**Producer**

**Armco** 2000.1, 3300.1, 3400.1, 3500.1, 3600.1,  
3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1,  
4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1,  
4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1,  
5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1,  
6100.1, 6200.1, 6300.1, 7100.1, 7200.1

**Australia** 1100.1, 1200.1, 1300.1, 1400.1, 1500.1,  
1600.1, 1700.1, 1800.1, 1900.1

**Bunge** 16500.1

**DTNSRDC** 19000.1, 19100.1, 19200.1

**Kobe** 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6,  
2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6,  
2600.9, 2600.12, 2600.15, 2600.18, 2700.1

**Lukens** 7300.1, 7800.1, 7900.1, 9000.1, 9100.1,  
12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1,  
15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1,  
16200.1, 16300.1, 16400.1, 16600.1, 19500.1

**Minsy** 19300.1, 19400.1

**OrStMills** 6400.1, 8600.1, 8700.1, 8800.1, 8900.1

**Sumitomo** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-  
1000.14, 2800.1-2800.3, 2800.6, 2900.1-2900.3,  
2900.6, 3000.1-3000.3, 3000.6, 13800.1-13800.5,  
13800.34, 13900.1, 13900.24, 14000.1, 14000.4,  
14100.1, 14100.4-14100.9, 14200.1, 14300.1, 14400.1,  
14500.1, 14600.1

**US Steel** 3100.1, 3200.1, 6500.1, 6600.1, 6700.1,  
6800.1, 6900.1, 7000.1, 7400.1, 7500.1, 7600.1,  
7700.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1,  
8500.1, 9200.1, 9300.1

**Q**

**Q,K Final Processing** 12500.1, 12700.1

**Q,K Heat Treatment** 9400.1, 9500.1, 9500.4,  
9600.1, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4,  
9900.7, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4,  
10400.1, 10500.1, 10600.1, 10700.1, 10700.4, 10800.1,  
10900.1, 11000.1, 11100.1, 11200.1, 11200.4, 11300.1,  
11400.1, 11500.1, 11600.1, 11700.1, 11800.1, 11800.5,  
11900.1, 11900.4, 12000.1, 12100.1, 12200.1, 12300.1,  
12400.1, 12500.1, 12700.1

**Q,T Final Processing** 2100.1-2100.3, 2100.6,  
2200.1-2200.3, 2200.6, 2300.1-2300.3, 2400.1-2400.3,  
2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1,  
2600.1-2600.3, 2600.6, 2600.9, 2600.12, 2600.15,

2600.18, 2700.1, 7100.1, 7200.1, 12600.1, 16400.1,  
18600.1, 18700.1, 18800.1, 18900.1, 19500.1, 19600.1

**Q,T Heat Treatment** 7100.1, 7200.1, 12600.1,

15300.1, 15400.1, 15500.1, 15600.1, 16400.1, 18600.1,  
18700.1, 18800.1, 18900.1, 19500.1, 19600.1

**Q,T,W Final Processing** 19600.7

**Q,T,W Heat Treatment** 19600.7

**R****Reference**

**004-2** 1100.1-1100.2, 1100.5-1100.6, 1200.1-  
1200.2, 1200.5-1200.6, 1300.1-1300.2, 1300.5-1300.6,  
1400.1-1400.2, 1400.5-1400.6, 1500.1-1500.2, 1500.5-  
1500.6, 1600.1-1600.2, 1600.5-1600.6, 1700.1-1700.2,  
1700.5-1700.6, 1800.1-1800.2, 1800.5-1800.6, 1900.1-  
1900.2, 1900.5-1900.6

**007-1** 2100.1-2100.8, 2200.1-2200.8, 2300.1-  
2300.8, 2400.1-2400.20, 2500.1-2500.18, 2600.1-  
2600.20, 2700.1-2700.18

**007-4** 2800.1-2800.8, 2900.1-2900.8, 3000.1-  
3000.8

**1010** 7800.1-7800.6, 7900.1-7900.6

**1120** 16600.1-16600.7

**1211** 9000.1-9000.2, 9000.5-9000.9, 9100.1-9100.3,  
9100.6-9100.9

**3200** 12600.1-12600.14

**3201** 15400.1-15400.6, 15700.1-15700.3, 15700.6-  
15700.8, 15800.1-15800.3, 15800.6-15800.8, 15900.1-  
15900.6, 16000.1-16000.6, 16100.1-16100.3, 16100.6-  
16100.8, 16200.1-16200.6, 16300.1-16300.6

**3202** 15300.1-15300.6, 15500.1-15500.2, 15500.5-  
15500.7, 15600.1-15600.6, 16400.1-16400.6

**3400** 12500.1-12500.6, 12700.1-12700.7

**3530** 19500.1-19500.7

**Armco-MPC** 3300.1-3300.4, 3400.1-3400.4,  
3500.1-3500.4, 3600.1-3600.4, 3700.1-3700.4, 3800.1-  
3800.4, 3900.1-3900.3, 4000.1-4000.3, 4100.1-4100.3,  
4200.1-4200.3, 4300.1-4300.3, 4400.1-4400.4, 4500.1-  
4500.4, 4600.1-4600.3, 4700.1-4700.3, 4800.1-4800.3,  
4900.1-4900.3, 5000.1-5000.4, 5100.1-5100.4, 5200.1-  
5200.4, 5300.1-5300.4, 5400.1-5400.3, 5500.1-5500.3,  
5600.1-5600.3, 5700.1-5700.3, 5800.1-5800.3, 5900.1-  
5900.3, 6000.1-6000.3, 6100.1-6100.3, 6200.1-6200.3,  
6300.1-6300.3

**KONKUL-1** 3100.1-3100.11, 3200.1-3200.21,  
7400.1-7400.11, 7500.1-7500.21, 7600.1-7600.21,  
7700.1-7700.21, 9200.1-9200.21, 9300.1-9300.21

**LR3201** 7300.1-7300.6

**METZ/MPC13** 2000.1-2000.9

**OGC-1** 6400.1-6400.23, 6500.1-6500.5, 6600.1-  
6600.5, 6700.1-6700.5, 6800.1-6800.6, 6900.1-6900.2,  
8000.1-8000.5, 8100.1-8100.5, 8200.1-8200.5, 8300.1-  
8300.5, 8400.1-8400.2, 8500.1-8500.5, 8600.1-8600.5,

8700.1-8700.5, 8800.1-8800.5, 8900.1-8900.2  
**S-1971** 1000.1-1000.14  
**SHI-01** 13800.1-13800.37, 13900.1-13900.26,  
 14000.1-14000.23, 14100.1-14100.10, 14200.1-14200.49,  
 14300.1-14300.49, 14400.1-14400.49, 14500.1-14500.47,  
 14600.1-14600.47  
**SSC-276** 7100.1-7100.6  
**USN 6/9** 18600.1-18600.6, 18700.1-18700.5,  
 18800.1-18800.6, 18900.1-18900.6, 19000.1-19000.7,  
 19100.1-19100.7, 19200.1-19200.7, 19300.1-19300.7,  
 19400.1-19400.7, 19600.1-19600.21  
**USN 9/9** 12800.1-12800.5, 12900.1-12900.5,  
 13000.1-13000.5, 13100.1-13100.5, 13200.1-13200.3,  
 13300.1-13300.5, 13400.1-13400.5, 13500.1-13500.5,  
 13600.1-13600.5, 13700.1-13700.3  
**USN-1** 16700.1-16700.28, 16800.1-16800.7, 16900.1-  
 16900.7, 17000.1-17000.11, 17100.1-17100.19, 17200.1-  
 17200.46, 17300.1-17300.19, 17400.1-17400.28,  
 17500.1-17500.19, 17600.1-17600.7, 17700.1-17700.28,  
 17800.1-17800.7, 17900.1-17900.46, 18000.1-18000.11,  
 18100.1-18100.11, 18200.1-18200.28, 18300.1-18300.46,  
 18400.1-18400.28, 18500.1-18500.7  
**WJ,3/87** 16500.1-16500.7  
**WJ,7/87** 14700.1-14700.28, 14800.1-14800.28,  
 14900.1-14900.19, 15000.1-15000.28, 15100.1-15100.28,  
 15200.1-15200.19  
**Round Specimen Type** 2800.1-2800.2, 2900.1-  
 2900.2, 3000.1-3000.2, 7100.1, 7200.1, 7200.7,  
 14100.1, 14100.4

## S

**S Lot ID** 4800.1-4800.3  
**S-1971 Reference** 1000.1-1000.14  
**SAW Weld Type** 2500.1, 2500.4, 2500.7, 2500.10,  
 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10,  
 2700.13, 2700.16, 3200.1, 3200.4-3200.20, 7200.7-  
 7200.8, 7200.13, 7500.1, 7500.4-7500.20, 7700.1,  
 7700.4-7700.20, 9300.1, 9300.4-9300.20, 10200.4-  
 10200.6, 10800.4-10800.6, 10900.4-10900.6, 11000.4-  
 11000.6, 11500.4-11500.6, 12300.4-12300.6, 13900.1,  
 13900.4-13900.26, 14300.1-14300.48, 14500.1-14500.47  
**SHI-01 Reference** 13800.1-13800.37, 13900.1-  
 13900.26, 14000.1-14000.23, 14100.1-14100.10,  
 14200.1-14200.49, 14300.1-14300.49, 14400.1-14400.49,  
 14500.1-14500.47, 14600.1-14600.47  
**Shielding Gas**  
**None** 10500.4-10500.6  
**Si-Al Killing Process** 7400.1, 7500.1  
**Silicon Killing Process** 1000.1-1000.3, 1000.6,  
 1000.9, 1000.12-1000.14  
**SX Killing Process** 3300.1, 3400.1, 3500.1, 3600.1,  
 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1,  
 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1,

4900.1, 5000.1, 5100.1, 5200.1, 5300.1  
**Slow Loading Type** 2000.3, 7000.2, 14700.2,  
 14700.11, 14700.20, 14800.2, 14800.11, 14800.20,  
 14900.2, 14900.11, 15000.2, 15000.11, 15000.20,  
 15100.2, 15100.11, 15100.20, 15200.2, 15200.11  
**SMA Weld Type** 3100.2-3100.10, 7400.2-7400.10,  
 7600.2-7600.20, 9200.2-9200.20, 13800.8-13800.36,  
 14200.1-14200.48, 16500.1, 16500.5, 19000.1, 19100.1,  
 19200.1, 19300.1, 19400.1, 19600.7, 19600.14  
**SMAW Weld Type** 9700.7-9700.9, 10200.8-10200.10,  
 10500.4-10500.6, 12300.8-12300.14  
**SMAW/SAW Weld Type** 9900.7-9900.9  
**Smooth Butt Joint Preparation** 6400.4, 6400.7,  
 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.1,  
 6500.4, 8000.1, 8000.4, 8600.1, 8600.4, 10200.4-  
 10200.6

## Source

**Armco** 2000.1, 3300.1, 3400.1, 3500.1, 3600.1  
**Armco D&M** 3700.1, 3800.1, 3900.1, 4000.1,  
 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1,  
 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1,  
 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1,  
 5900.1, 6000.1, 6100.1, 6200.1, 6300.1  
**Australia** 1100.1, 1200.1, 1300.1, 1400.1, 1500.1,  
 1600.1, 1700.1, 1800.1, 1900.1  
**HIFAB** 14700.1, 14800.1, 14900.1, 15000.1,  
 15100.1, 15200.1  
**Kobe** 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6,  
 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12,  
 2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6,  
 2600.9, 2600.12, 2600.15, 2600.18, 2700.1  
**Lukens** 7300.1, 7800.1, 7900.1, 9000.1, 9100.1,  
 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1,  
 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1,  
 16200.1, 16300.1, 16400.1, 16600.1, 19500.1  
**OGC** 6400.1, 6500.1, 6600.1, 6700.1, 6800.1,  
 6900.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1,  
 8500.1, 8600.1, 8700.1, 8800.1, 8900.1  
**P&EStat** 16500.1  
**Sumitomo** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-  
 1000.14, 2800.1-2800.3, 2800.6, 2900.1-2900.3,  
 2900.6, 3000.1-3000.3, 3000.6, 13800.1-13800.5,  
 13800.34, 13900.1, 13900.24, 14000.1, 14000.4,  
 14100.1, 14100.4-14100.9, 14200.1, 14300.1, 14400.1,  
 14500.1, 14600.1  
**SWRI** 7100.1, 7200.1  
**Un Kansas** 7000.1  
**US Steel** 3100.1, 3200.1, 7400.1, 7500.1, 7600.1,  
 7700.1, 9200.1, 9300.1  
**USN** 12800.1, 12900.1, 13000.1, 13100.1, 13200.1,  
 13300.1, 13400.1, 13500.1, 13600.1, 13700.1, 18600.1,  
 18700.1, 18800.1, 18900.1, 19000.1, 19100.1, 19200.1,  
 19300.1, 19400.1, 19600.1, 19600.7

**Specimen Type****2/3** 9400.2, 9600.2**3/4** 9500.2, 9500.5, 9700.2, 9700.5-9700.9, 9800.2, 9900.2, 9900.5-9900.9, 10200.2-10200.10, 11300.2, 11400.2, 11500.2, 11600.2, 11700.2, 11700.5**Compact** 7800.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2**Compact Tension** 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15**Cylindrical** 3100.1, 7000.1, 7300.1, 7400.1, 7600.1, 7800.1, 7900.1, 9000.1, 9100.1, 9200.1, 12500.1, 12600.1, 12700.1, 14700.3, 14700.8, 14700.12, 14700.17, 14700.21, 14700.26, 14800.3, 14800.8, 14800.12, 14800.17, 14800.21, 14800.26, 14900.3, 14900.8, 14900.12, 14900.17, 15000.3, 15000.8, 15000.12, 15000.17, 15000.21, 15000.26, 15100.3, 15100.8, 15100.12, 15100.17, 15100.21, 15100.26, 15200.3, 15200.8, 15200.12, 15200.17, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2, 16500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14**Double Notch Bend** 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11**Dynamic Tear** 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9-12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20**Flat** 13800.1-13800.2**Full** 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6, 2300.1-2300.3, 2300.6, 2400.1-2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2-2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.1-2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2-2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6, 3100.2-3100.10, 3200.2-3200.20, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2,

4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.2-6500.4, 6600.2-6600.4, 6700.2-6700.4, 6800.2-6800.4, 6900.1, 7000.5, 7100.2, 7200.2, 7200.8, 7200.13, 7300.2, 7400.2-7400.10, 7500.2-7500.20, 7600.2-7600.20, 7700.2-7700.20, 7800.3, 7900.3, 8000.2-8000.4, 8100.2-8100.4, 8200.2-8200.4, 8300.2-8300.4, 8400.1, 8500.2-8500.4, 8600.2-8600.4, 8700.2-8700.4, 8800.2-8800.4, 8900.1, 9000.2, 9100.3, 9200.2-9200.20, 9300.2-9300.20, 10100.2, 10300.2, 10300.5, 10400.2, 10500.2-10500.6, 10600.1, 10700.2-10700.4, 10800.2-10800.6, 10900.2-10900.6, 11000.2-11000.6, 11100.1, 11200.2, 11200.5, 11500.4-11500.6, 11800.2, 11800.5, 11900.2-11900.4, 12000.2, 12100.2, 12200.2, 12300.2-12300.14, 12400.2, 12500.3, 12600.3, 12600.6, 12700.3, 12800.2, 12900.2, 13000.2, 13100.2, 13200.2, 13300.2, 13400.2, 13500.2, 13600.2, 13700.2, 13800.8-13800.32, 13900.2-13900.22, 14100.5-14100.9, 14700.4-14700.6, 14700.9, 14700.13-14700.15, 14700.18, 14700.22-14700.24, 14700.27, 14800.4-14800.6, 14800.9, 14800.13-14800.15, 14800.18, 14800.22-14800.24, 14800.27, 14900.4-14900.6, 14900.9, 14900.13-14900.15, 14900.18, 15000.4-15000.6, 15000.9, 15000.13-15000.15, 15000.18, 15000.22-15000.24, 15000.27, 15100.4-15100.6, 15100.9, 15100.13-15100.15, 15100.18, 15100.22-15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-15200.15, 15200.18, 15300.2, 15400.2, 15500.2, 15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3, 16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3,

19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5,  
19600.3, 19600.10, 19600.16 19600.18

**P-1** 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6,  
1600.6, 1700.6, 1800.6, 1900.6, 13800.7, 14100.2

**P-2** 10600.4, 10700.7, 11100.4, 11800.4, 11300.6

**P-3** 7100.4, 7200.4, 7200.10, 10000.5, 10100.5

**Round** 2800.1-2800.2, 2900.1-2900.2, 3000.1-  
3000.2, 7100.1, 7200.1, 7200.7, 14100.1, 14100.4

**SSC-276 Reference** 7100.1-7100.6

**Standard Method**

**813** 18600.2, 18700.1, 18800.2, 18900.2, 19600.2,  
19600.9, 19600.15

**ABS Sec43** 2800.3, 2800.6, 2900.3, 2900.6,  
3000.3, 3000.6

**BS131H2** 14700.4-14700.6, 14700.9, 14700.13-  
14700.15, 14700.18, 14700.22-14700.24, 14700.27,  
14800.4-14800.6, 14800.9, 14800.13-14800.15, 14800.18,  
14800.22-14800.24, 14800.27, 14900.4-14900.6,  
14900.9, 14900.13-14900.15, 14900.18, 15000.4-  
15000.6, 15000.9, 15000.13-15000.15, 15000.18,  
15000.22-15000.24, 15000.27, 15100.4-15100.6,  
15100.9, 15100.13-15100.15, 15100.18, 15100.22-  
15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-  
15200.15, 15200.18

**BS5762** 7000.2, 13800.34-13800.37, 13900.24-  
13900.26, 14200.2-14200.5, 14300.2-14300.5, 14400.2-  
14400.5, 14500.2-14500.5, 14600.2-14600.5, 14700.2,  
14700.11, 14700.20, 14800.2 14800.11, 14800.20,  
14900.2, 14900.11, 15000.2, 15000.11, 15000.20,  
15100.2, 15100.11, 15100.20, 15200.2, 15200.11

**E 208** 1000.14, 1100.6, 1200.6, 1300.6, 1400.6,  
1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 2000.7,  
3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1,  
3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1,  
4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1,  
5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1,  
5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1,  
6300.1, 7100.4, 7200.4, 7200.10, 13800.7

**E 23** 7100.2, 16500.3, 16500.6, 18600.3, 18700.2,  
18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4,  
19400.4, 19600.3, 19600.10, 19600.16-19600.18

**E 604** 2000.8, 7100.5, 7200.5, 7200.11, 7200.15,  
18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6,  
19200.6, 19300.6, 19400.6, 19600.5, 19600.12, 19600.20

**E 8** 7100.1, 7200.1, 7200.7, 16500.2, 16500.5,  
18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2,  
19300.2, 19400.2, 19600.1, 19600.8, 19600.14

**E318** 12600.2

**E813** 7800.2, 7900.2, 9000.6, 9100.2, 12500.2,  
12700.2, 15700.2, 15800.2, 15900.2, 16100.2, 19000.3,  
19100.3, 19200.3, 19300.3, 19400.3

**JISZ3121** 14600.46 14600.47

**Standard Year**

**1969** 1000.14, 18600.1, 18800.1, 18900.1, 19000.2,  
19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8,  
19600.14

**1972** 18600.3, 18700.2, 18800.3, 18900.3, 19600.3,  
19600.10, 19600.16-19600.18

**1976** 7100.5, 7200.5, 7200.11, 7200.15

**1979** 7000.2, 14700.2, 14700.11, 14700.20, 14800.2,  
14800.11, 14800.20, 14900.2, 14900.11, 15000.2,  
15000.11, 15000.20, 15100.2, 15100.11, 15100.20,  
15200.2, 15200.11

**1980** 18600.5, 18700.4, 18800.5, 18900.5, 19600.5,  
19600.12, 19600.20

**1981** 16500.2-16500.5

**1987** 7800.2, 9000.6, 9100.2, 12500.2, 12600.2,  
12700.2, 15700.2, 15800.2, 15900.2, 16100.2

**Sumitomo Producer** 1000.1-1000.3, 1000.6, 1000.9,  
1000.12-1000.14, 2800.1-2800.3, 2800.6, 2900.1-  
2900.3, 2900.6, 3000.1-3000.3, 3000.6, 13800.1-  
13800.5, 13800.34, 13900.1, 13900.24, 14000.1,  
14000.4, 14100.1, 14100.4-14100.9, 14200.1, 14300.1,  
14400.1, 14500.1, 14600.1

**Sumitomo Source** 1000.1-1000.3, 1000.6, 1000.9,  
1000.12-1000.14, 2800.1-2800.3, 2800.6, 2900.1-  
2900.3, 2900.6, 3000.1-3000.3, 3000.6, 13800.1-  
13800.5, 13800.34, 13900.1, 13900.24, 14000.1,  
14000.4, 14100.1, 14100.4-14100.9, 14200.1, 14300.1,  
14400.1, 14500.1, 14600.1

**Surface Location wrt Surface** 14700.1, 14700.11,  
14700.20, 14800.1, 14800.11, 14800.20, 14900.1,  
14900.11, 15000.1, 15000.11, 15000.20, 15100.1,  
15100.11, 15100.20, 15200.1, 15200.11

**SWRI Source** 7100.1, 7200.1

## T

**T Location** 1000.1-1000.3, 1000.9, 1000.12-1000.14

**T Lot ID** 4700.1-4700.3

**Tensile Test Type** 1000.1-1000.2, 1100.1, 1200.1,  
1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1,  
1900.1, 2000.1, 2100.1-2100.2, 2200.1-2200.2, 2300.1-  
2300.2, 2400.1-2400.2, 2600.1-2600.2, 2800.1-2800.2,  
2900.1-2900.2, 3000.1-3000.2, 3100.1, 7000.1, 7100.1,  
7200.1, 7200.7, 7300.1, 7400.1, 7600.1, 7800.1,  
7900.1, 9000.1, 9100.1, 9200.1, 9400.1, 9500.1,  
9500.4, 9600.1, 9600.4, 9600.7, 9700.1, 9700.4,  
9800.1, 9900.1, 9900.4, 10000.1, 10100.1, 10200.1,  
10300.1, 10300.4, 10400.1, 10500.1, 10700.1, 10800.1,  
10900.1, 11000.1, 11200.1, 11200.4, 11300.1, 11400.1,  
11500.1, 11600.1, 11700.1, 11700.4, 11800.1, 11900.1,  
12000.1, 12100.1, 12200.1, 12300.1, 12400.1, 12500.1,  
12600.1, 12700.1, 12800.1, 12900.1, 13000.1, 13100.1,  
13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1,  
13800.1-13800.2, 14100.1, 14100.4, 14500.46-14500.47,  
14600.46-14600.47, 14700.3, 14700.8, 14700.12,

14700.17, 14700.21, 14700.26, 14800.3, 14800.8,  
14800.12, 14800.17, 14800.21, 14800.26, 14900.3,  
14900.8, 14900.12, 14900.17, 15000.3, 15000.8,  
15000.12, 15000.17, 15000.21, 15000.26, 15100.3,  
15100.8, 15100.12, 15100.17, 15100.21, 15100.26,  
15200.3, 15200.8, 15200.12, 15200.17, 15300.1,  
15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1,  
16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2,  
16500.5, 16600.5, 16700.1, 16700.5, 16700.8, 16700.11,  
16700.14, 16700.17, 16700.20, 16700.23, 16700.26,  
16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7,  
17100.1, 17100.5, 17100.8, 17100.11, 17100.14,  
17100.17, 17200.1, 17200.7, 17200.12, 17200.17,  
17200.22, 17200.27, 17200.32, 17200.37, 17200.42,  
17300.1, 17300.5, 17300.8, 17300.11, 17300.14,  
17300.17, 17400.1, 17400.5, 17400.8, 17400.11,  
17400.14, 17400.17, 17400.20, 17400.23, 17400.26,  
17500.1, 17500.5, 17500.8, 17500.11, 17500.14,  
17500.17, 17600.1, 17600.5, 17700.1, 17700.5, 17700.8,  
17700.11, 17700.14, 17700.17, 17700.20, 17700.23,  
17700.26, 17800.1, 17800.5, 17900.1, 17900.7, 17900.12,  
17900.17, 17900.22, 17900.27, 17900.32, 17900.37,  
17900.42, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1,  
18200.5, 18200.8, 18200.11, 18200.14, 18200.17,  
18200.20, 18200.23, 18200.26, 18300.1, 18300.7,  
18300.12, 18300.17, 18300.22, 18300.27, 18300.32,  
18300.37, 18300.42, 18400.1, 18400.5, 18400.8,  
18400.11, 18400.14, 18400.17, 18400.20, 18400.23,  
18400.26, 18500.1, 18500.5, 18600.1, 18800.1, 18900.1,  
19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19500.1,  
19600.1, 19600.8, 19600.14

**Test Type****Charpy V Impact**

1000.3, 1000.6, 1000.9,  
1000.12, 1100.2, 1200.2, 1300.2, 1400.2, 1500.2,  
1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2100.3,  
2100.6, 2200.3, 2200.6, 2300.3, 2300.6, 2400.3,  
2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2-  
2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3,  
2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2-  
2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 2800.3,  
2800.6, 2900.3, 2900.6, 3000.3, 3000.6, 3100.2,  
3100.10, 3200.2-3200.20, 3300.2, 3400.2, 3500.2,  
3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2,  
4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2,  
4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2,  
5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2,  
6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4,  
6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21,  
6500.2-6500.4, 6600.2-6600.4, 6700.2-6700.4, 6800.2-  
6800.4, 6900.1, 7000.5, 7100.2, 7200.2, 7200.8,  
7200.13, 7300.2, 7400.2-7400.10, 7500.2-7500.20,  
7600.2-7600.20, 7700.2-7700.20, 7800.3, 7900.3,  
8000.2-8000.4, 8100.2-8100.4, 8200.2-8200.4, 8300.2-

8300.4, 8400.1, 8500.2-8500.4, 8600.2-8600.4, 8700.2-  
8700.4, 8800.2-8800.4, 8900.1, 9000.2, 9100.3,  
9200.2-9200.20, 9300.2-9300.20, 9400.2, 9500.2,  
9500.5, 9600.2, 9600.5, 9700.2, 9700.5-9700.9,  
9800.2, 9900.2, 9900.5-9900.9, 10000.2, 10100.2,  
10200.2, 10200.10, 10300.2, 10300.5, 10400.2, 10500.2-  
10500.6, 10600.1, 10700.2-10700.4, 10800.2-10800.6,  
10900.2-10900.6, 11000.2-11000.6, 11100.1, 11200.2,  
11200.5, 11300.2, 11400.2, 11500.2-11500.6, 11600.2,  
11700.2, 11700.5, 11800.2, 11800.5, 11900.2-11900.4,  
12000.2, 12100.2, 12200.2, 12300.2-12300.14, 12400.2,  
12500.3, 12600.3, 12600.6, 12700.3, 12800.2, 12900.2,  
13000.2, 13100.2, 13200.2, 13300.2, 13400.2, 13500.2,  
13600.2, 13700.2, 13800.3-13800.5, 13800.8-13800.32,  
13900.2-13900.22, 14000.4-14000.22, 14100.5-14100.9,  
14200.6-14200.48, 14300.6-14300.48, 14400.6-14400.48,  
14500.6-14500.44, 14600.6-14600.44, 14700.4-14700.6,  
14700.9, 14700.13-14700.15, 14700.18, 14700.22-  
14700.24, 14700.27, 14800.4-14800.6, 14800.9, 14800.13-  
14800.15, 14800.18, 14800.22-14800.24, 14800.27,  
14900.4-14900.6, 14900.9, 14900.13-14900.15, 14900.18,  
15000.4-15000.6, 15000.9, 15000.13-15000.15, 15000.18,  
15000.22-15000.24, 15000.27, 15100.4-15100.6,  
15100.9, 15100.13-15100.15, 15100.18, 15100.22-  
15100.24, 15100.27, 15200.4-15200.6, 15200.9, 15200.13-  
15200.15, 15200.18, 15300.2, 15400.2, 15500.2,  
15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3,  
16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16600.2,  
16700.2, 16700.6, 16700.9, 16700.12, 16700.15,  
16700.18, 16700.21, 16700.24, 16700.27, 16800.2,  
16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2,  
17100.6, 17100.9, 17100.12, 17100.15, 17100.18,  
17200.2, 17200.8, 17200.13, 17200.18, 17200.23,  
17200.28, 17200.33, 17200.38, 17200.43, 17300.2,  
17300.6, 17300.9, 17300.12, 17300.15, 17300.18,  
17400.2, 17400.6, 17400.9, 17400.12, 17400.15,  
17400.18, 17400.21, 17400.24, 17400.27, 17500.2,  
17500.6, 17500.9, 17500.12, 17500.15, 17500.18,  
17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12,  
17700.15, 17700.18, 17700.21, 17700.24, 17700.27,  
17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18,  
17900.23, 17900.28, 17900.33, 17900.38, 17900.43,  
18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6,  
18200.9, 18200.12, 18200.15, 18200.18, 18200.21,  
18200.24, 18200.27, 18300.2, 18300.8, 18300.13,  
18300.18, 18300.23, 18300.28, 18300.33, 18300.38,  
18300.43, 18400.2, 18400.6, 18400.9, 18400.12,  
18400.15, 18400.18, 18400.21, 18400.24, 18400.27,  
18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3,  
19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5,  
19600.3, 19600.16-19600.18

**Dynamic Tear**

2000.8, 7100.5, 7200.5, 7200.11,  
7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7,



12500.5, 12600.9-12600.13, 12700.6, 12800.4, 12900.4,  
13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4,  
15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7,  
15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5,  
16600.6, 17000.5, 17000.10, 17200.5, 17200.10,  
17200.15, 17200.20, 17200.25, 17200.30, 17200.35,  
17200.40, 17200.45, 17900.5, 17900.10, 17900.15,  
17900.20, 17900.25, 17900.30, 17900.35, 17900.40,  
17900.45, 18000.5, 18000.10, 18100.5, 18100.10,  
18300.5, 18300.10, 18300.15, 18300.20, 18300.25,  
18300.30, 18300.35, 18300.40, 18300.45, 18600.5,  
18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6,  
19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

**Fracture Toughness** 2000.3, 7000.2, 7800.2,  
7900.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2,  
13800.34-13800.37, 13900.24-13900.26, 14000.2-  
14000.3, 14100.3, 14200.2-14200.5, 14300.2-14300.5,  
14400.2-14400.5, 14500.2-14500.5, 14600.2-14600.5,  
14700.2, 14700.11, 14700.20, 14800.2, 14800.11,  
14800.20, 14900.2, 14900.11, 15000.2, 15000.11,  
15000.20, 15100.2, 15100.11, 15100.20, 15200.2,  
15200.11, 15700.2, 15800.2, 15900.2, 16100.2, 16600.1,  
18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3,  
19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

**Nil Ductility Transition** 1000.14, 1100.6,  
1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6,  
1800.6, 1900.6, 2000.7, 3300.1, 3400.1, 3500.1,  
3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1,  
4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1,  
4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1,  
5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1,  
6000.1, 6100.1, 6200.1, 6300.1, 7100.4, 7200.4,  
7200.10, 10000.5, 10100.5, 10600.4, 10700.7, 11100.4,  
11800.4, 11900.6, 13800.7, 14100.2

**Tensile** 1000.1-1000.2, 1100.1, 1200.1, 1300.1,  
1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1,  
2000.1, 2100.1-2100.2, 2200.1-2200.2, 2300.1-2300.2,  
2400.1-2400.2, 2600.1-2600.2, 2800.1-2800.2, 2900.1-  
2900.2, 3000.1-3000.2, 3100.1, 7000.1, 7100.1,  
7200.1, 7200.7, 7300.1, 7400.1, 7600.1, 7800.1,  
7900.1, 9000.1, 9100.1, 9200.1, 9400.1, 9500.1,  
9500.4, 9600.1, 9600.4, 9600.7, 9700.1, 9700.4,  
9800.1, 9900.1, 9900.4, 10000.1, 10100.1, 10200.1,  
10300.1, 10300.4, 10400.1, 10500.1, 10700.1, 10800.1,  
10900.1, 11000.1, 11200.1, 11200.4, 11300.1, 11400.1,  
11500.1, 11600.1, 11700.1, 11700.4, 11800.1, 11900.1,  
12000.1, 12100.1, 12200.1, 12300.1, 12400.1, 12500.1,  
12600.1, 12700.1, 12800.1, 12900.1, 13000.1, 13100.1,  
13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1,  
13800.1-13800.2, 14100.1, 14100.4, 14500.46-14500.47,  
14600.46-14600.47, 14700.3, 14700.8, 14700.12,  
14700.17, 14700.21, 14700.26, 14800.3, 14800.8,  
14800.12, 14800.17, 14800.21, 14800.26, 14900.3,

14900.8, 14900.12, 14900.17, 15000.3, 15000.8,  
15000.12, 15000.17, 15000.21, 15000.26, 15100.3,  
15100.8, 15100.12, 15100.17, 15100.21, 15100.26,  
15200.3, 15200.8, 15200.12, 15200.17, 15300.1,  
15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1,  
16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2,  
16500.5, 16600.5, 16700.1, 16700.5, 16700.8, 16700.11,  
16700.14, 16700.17, 16700.20, 16700.23, 16700.26,  
16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7,  
17100.1, 17100.5, 17100.8, 17100.11, 17100.14,  
17100.17, 17200.1, 17200.7, 17200.12, 17200.17,  
17200.22, 17200.27, 17200.32, 17200.37, 17200.42,  
17300.1, 17300.5, 17300.8, 17300.11, 17300.14,  
17300.17, 17400.1, 17400.5, 17400.8, 17400.11,  
17400.14, 17400.17, 17400.20, 17400.23, 17400.26,  
17500.1, 17500.5, 17500.8, 17500.11, 17500.14,  
17500.17, 17600.1, 17600.5, 17700.1, 17700.5, 17700.8,  
17700.11, 17700.14, 17700.17, 17700.20, 17700.23,  
17700.26, 17800.1, 17800.5, 17900.1, 17900.7, 17900.12,  
17900.17, 17900.22, 17900.27, 17900.32, 17900.37,  
17900.42, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1,  
18200.5, 18200.8, 18200.11, 18200.14, 18200.17,  
18200.20, 18200.23, 18200.26, 18300.1, 18300.7,  
18300.12, 18300.17, 18300.22, 18300.27, 18300.32,  
18300.37, 18300.42, 18400.1, 18400.5, 18400.8,  
18400.11, 18400.14, 18400.17, 18400.20, 18400.23,  
18400.26, 18500.1, 18500.5, 18600.1, 18800.1, 18900.1,  
19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19500.1,  
19600.1, 19600.8, 19600.14

**Top Composition Position** 2100.1-2100.5, 2200.1-  
2200.5, 2300.1-2300.8, 2400.1-2400.5, 2400.9-2400.11,  
2400.15-2400.17, 2500.1-2500.18, 2600.1-2600.5,  
2600.9-2600.11, 2600.15-2600.17, 2700.1-2700.18,  
2800.1-2800.5, 2900.1-2900.5, 3000.1-3000.5

**Top Ingot Position** 2100.1-2100.3, 2200.1-2200.3,  
2300.1-2300.3, 2400.1-2400.3, 2400.9, 2400.15,  
2500.1, 2600.1-2600.3, 2600.9, 2600.15, 2700.1,  
16700.1, 16800.1, 16900.1, 17000.1, 17100.1, 17200.1,  
17300.1, 17400.1, 17500.1, 17600.1, 17700.1, 17800.1,  
17900.1, 18000.1, 18100.1, 18200.1, 18300.1, 18400.1,  
18500.1

**Transverse Location wrt Weld** 14500.46-  
14500.47, 14600.46-14600.47

**TSAW Weld Type** 14000.1-14000.22, 14400.1-  
14400.48, 14600.1-14600.47

**TW8544 Filler Name** 6400.16, 6400.19-6400.21,  
6700.1, 6700.4, 6800.1, 6800.4, 8300.1, 8300.4,  
8500.1, 8500.4, 8800.1, 8800.4

## U

**U Groove Joint Preparation** 2500.1, 2500.4,  
2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4,  
2700.7, 2700.10, 2700.13, 2700.16

**Un Kansas Source** 7000.1  
**US Steel Producer** 3100.1, 3200.1, 6500.1, 6600.1, 6700.1, 6800.1, 6900.1, 7000.1, 7400.1, 7500.1, 7600.1, 7700.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1, 8500.1, 9200.1, 9300.1  
**US Steel Source** 3100.1, 3200.1, 7400.1, 7500.1, 7600.1, 7700.1, 9200.1, 9300.1  
**US-43 Flux Name** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16  
**USN 6/9 Reference** 18600.1-18600.6, 18700.1-18700.5, 18800.1-18800.6, 18900.1-18900.6, 19000.1-19000.7, 19100.1-19100.7, 19200.1-19200.7, 19300.1-19300.7, 19400.1-19400.7, 19600.1-19600.21  
**USN 9/9 Reference** 12800.1-12800.5, 12900.1-12900.5, 13000.1-13000.5, 13100.1-13100.5, 13200.1-13200.3, 13300.1-13300.5, 13400.1-13400.5, 13500.1-13500.5, 13600.1-13600.5, 13700.1-13700.3  
**USN Source** 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1, 18600.1, 18700.1, 18800.1, 18900.1, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.1, 19600.7  
**USN-1 Reference** 16700.1-16700.28, 16800.1-16800.7, 16900.1-16900.7, 17000.1-17000.11, 17100.1-17100.19, 17200.1-17200.46, 17300.1-17300.19, 17400.1-17400.28, 17500.1-17500.19, 17600.1-17600.7, 17700.1-17700.28, 17800.1-17800.7, 17900.1-17900.46, 18000.1-18000.11, 18100.1-18100.11, 18200.1-18200.28, 18300.1-18300.46, 18400.1-18400.28, 18500.1-18500.7

## V

**V Groove Joint Preparation** 3200.1, 3200.4-3200.20, 7500.1, 7500.4-7500.20, 7700.1, 7700.4-7700.20, 9700.7-9700.9, 9900.7-9900.9, 10200.8-10200.10, 14700.1-14700.3, 14700.6-14700.8, 14700.11-14700.12, 14700.15-14700.17, 14700.20-14700.21, 14700.24-14700.26, 14800.1-14800.3, 14800.6-14800.8, 14800.11-14800.12, 14800.15-14800.17, 14800.20-14800.21, 14800.24-14800.26, 14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12, 14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8, 15000.11-15000.12, 15000.15-15000.17, 15000.20-15000.21, 15000.24-15000.26, 15100.1-15100.3, 15100.6-15100.8, 15100.11-15100.12, 15100.15-15100.17, 15100.20-15100.21, 15100.24-15100.26, 15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12, 15200.15-15200.17

**Vertical Welding Position** 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4

**Vert-Up Welding Position** 10500.4-10500.6, 12300.8-12300.14

## W

**W Final Processing** 19000.1, 19100.1, 19200.1, 19300.1, 19400.1

**W Heat Treatment** 19000.1, 19100.1, 19200.1, 19300.1, 19400.1

**W36 Filler Name** 13900.1, 13900.4-13900.26, 14000.1-14000.22, 14300.1-14300.48, 14400.1-14400.48, 14500.1-14500.47, 14600.1-14600.47

## Weld Type

**ESW** 6400.4, 6400.7, 6500.1, 6500.4, 8000.1, 8000.4, 8600.1, 8600.4

**FCA** 14700.1-14700.3, 14700.6-14700.8, 14700.11-14700.12, 14700.15-14700.17, 14700.20-14700.21, 14700.24-14700.26, 14800.1-14800.3, 14800.6-14800.8, 14800.11-14800.12, 14800.15-14800.17, 14800.20-14800.21, 14800.24-14800.26, 14900.1-14900.3, 14900.6-14900.8, 14900.11-14900.12, 14900.15-14900.17, 15000.1-15000.3, 15000.6-15000.8, 15000.11-15000.12, 15000.15-15000.17, 15000.20-15000.21, 15000.24-15000.26, 15100.1-15100.3, 15100.6-15100.8, 15100.11-15100.12, 15100.15-15100.17, 15100.20-15100.21, 15100.24-15100.26, 15200.1-15200.3, 15200.6-15200.8, 15200.11-15200.12, 15200.15-15200.17

**NGESW** 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4, 8800.1, 8800.4

**SAW** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4-3200.20, 7200.7-7200.8, 7200.13, 7500.1, 7500.4-7500.20, 7700.1, 7700.4-7700.20, 9300.1, 9300.4-9300.20, 10200.4-10200.6, 10800.4-10800.6, 10900.4-10900.6, 11000.4-11000.6, 11500.4-11500.6, 12300.4-12300.6, 13900.1, 13900.4-13900.26, 14300.1-14300.48, 14500.1-14500.47

**SMA** 3100.2-3100.10, 7400.2-7400.10, 7600.2-7600.20, 9200.2-9200.20, 13800.8-13800.36, 14200.1-14200.48, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

**SMAW** 9700.7-9700.9, 10200.8-10200.10, 10500.4-10500.6, 12300.8-12300.14

**SMAW/SAW** 9900.7-9900.9

**TSAW** 14000.1-14000.22, 14400.1-14400.48, 14600.1-14600.47

## Welding Position

**1G** 14800.11-14800.12, 14800.15-14800.17

**2G** 14700.11-14700.12, 14700.15-14700.17, 14800.20-14800.21, 14800.24-14800.26

**3G** 14700.20-14700.21, 14700.24-14700.26, 14900.1-14900.3, 14900.6-14900.8, 15000.20-15000.21, 15000.24-15000.26, 15100.1-15100.3, 15100.6-15100.8, 15100.20-15100.21, 15100.24-15100.26, 15200.11-15200.12, 15200.15-15200.17

**4G** 14800.1-14800.3, 14800.6-14800.8, 14900.11-14900.12, 14900.15-14900.17

**Downhand** 7200.7-7200.8, 7200.13, 13800.8-13800.36, 13900.1, 13900.4-13900.26, 14000.1-14000.22, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

**Downhand IG** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2-3100.10, 3200.1, 3200.4-3200.20, 7400.2-7400.10, 7500.1, 7500.4-7500.20, 14200.1-14200.48, 14300.1-14300.48, 14400.1-14400.48, 14500.1-14500.47, 14600.1-14600.47

**Flat** 9700.7-9700.9, 9900.7-9900.9, 10200.4-10200.10, 10800.4, 10800.6, 10900.4-10900.6, 11000.4-11000.6, 11500.4, 11500.6, 12300.4-12300.6

**IG** 7600.2-7600.20, 7700.1, 7700.4-7700.20, 9200.2-9200.20, 9300.1, 9300.4-9300.20, 14700.1-14700.3, 14700.6-14700.8, 15000.1-15000.3, 15000.6-15000.8, 15000.11-15000.12, 15000.15-15000.17, 15100.11-15100.12, 15100.15-15100.17, 15200.1-15200.3, 15200.6, 15200.8

**Vertical** 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4

**Vert-Up** 10500.4-10500.6, 12300.8-12300.14

**WJ,3/87 Reference** 16500.1-16500.7

**WJ,7/87 Reference** 14700.1-14700.28, 14800.1-14800.28, 14900.1-14900.19, 15000.1-15000.28, 15100.1-15100.28, 15200.1-15200.19

## Y

### Year Produced

**1971** 1000.1-1000.3, 1000.6, 1000.9, 1000.12-1000.14

**1972** 2100.1-2100.3, 2100.6, 2200.1-2200.3, 2200.6, 2300.1-2300.3, 2400.1-2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1-2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 2800.1, 2800.3, 2800.6, 2900.1-2900.3, 2900.6, 3000.1-3000.3, 3000.6

**1976** 15300.1, 15400.1, 16000.1, 16200.1

**1977** 16100.1, 16600.1

**1978** 7300.1, 15500.1, 15600.1, 15900.1

**1979** 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 15700.1, 15800.1

16300.1, 16400.1

**1980** 9000.1, 9100.1

**1981** 17400.1, 17400.11, 17400.20

**1982** 12600.1, 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5, 19500.1

**1983** 7800.1, 7900.1

**1984** 12500.1, 12700.1

**Yes Did Specimen Fracture?** 1100.2, 1200.2,

1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2200.6, 2900.3, 2900.6, 3300.2, 3400.2, 3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19-6400.21, 6500.2-6500.4, 6600.2-6600.4, 6700.2-6700.4, 6800.2-6800.4, 6900.1, 8000.2-8000.4, 8100.2-8100.4, 8200.2-8200.4, 8300.2-8300.4, 8400.1, 8500.2-8500.4, 8600.2-8600.4, 8700.2-8700.4, 8800.2-8800.4, 8900.1, 14100.5-14100.9

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